

S  
333.79  
B5b  
1982

butte-silver bow government

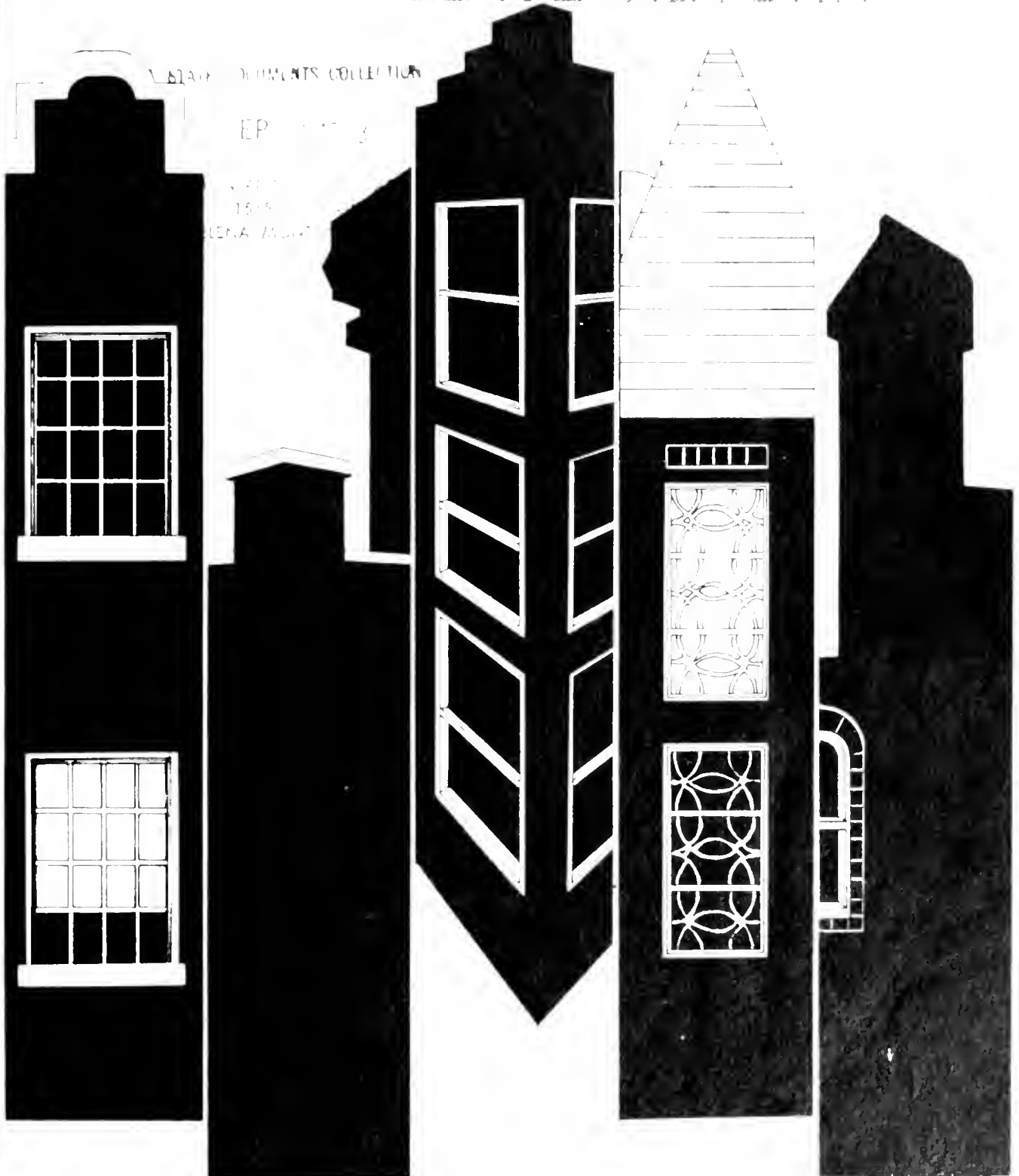
# ENERGY USE PROFILE

PLEASE RETURN

STATE DOCUMENTS COLLECTION

EP 1000

1982  
LENA MOUNT



MONTANA STATE LIBRARY  
S 333 79 B5b 1982 c 1 Pelletier  
Butte-Silver Bow government energy use p



3 0864 00045149 5

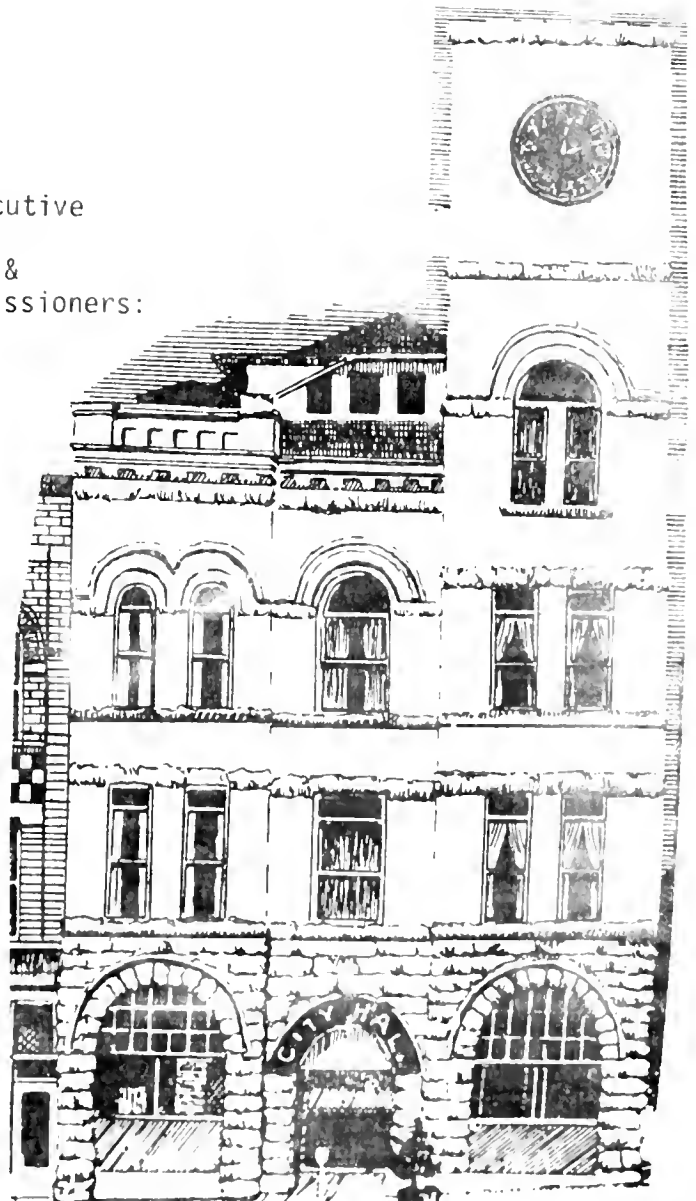
BUTTE-SILVER BOW GOVERNMENT  
ENERGY USE PROFILE

A report concerning the energy consumption of the Butte-Silver Bow Government with an energy efficiency plan for all Butte-Silver Bow Government facilities and operations included.

Prepared by  
Thomas H. Pelletier  
Energy Coordinator  
September 1982

Presented to:

Don Peoples, Chief Executive  
Department Heads  
Elected Officials &  
Members of Council of Commissioners:  
David Fisher  
Don Ulrich  
Dale Dart  
Joseph Ivanich  
Chris Carroll  
Margaret Leary  
John E. Jones  
Thomas C. Brophy  
Beverly Hayes  
Dan Rosa  
James R. Casey  
William O'Connor



## ACKNOWLEDGEMENTS

Many organizations and individuals have contributed to the success of the Butte-Silver Bow Energy Management Program. In appreciation of their support and contributions, we would like to thank the following:

Montana State Department of Natural Resources  
and Conservation

Montana Energy Division

National Center for Appropriate Technology

Montana Power Company

Human Resource Council, Dist. 12

North American Indian Alliance

Montana College of Mineral Science and Technology

Montana Energy Research and Development Institute

Multi Tech Inc.

Butte School District No. 1

Butte Public Library

Butte-Silver Bow Public Works Dept.

Butte-Silver Bow Budget Office

Montana Standard

KXLF TV

The Butte-Silver Bow Energy Advisory Committee

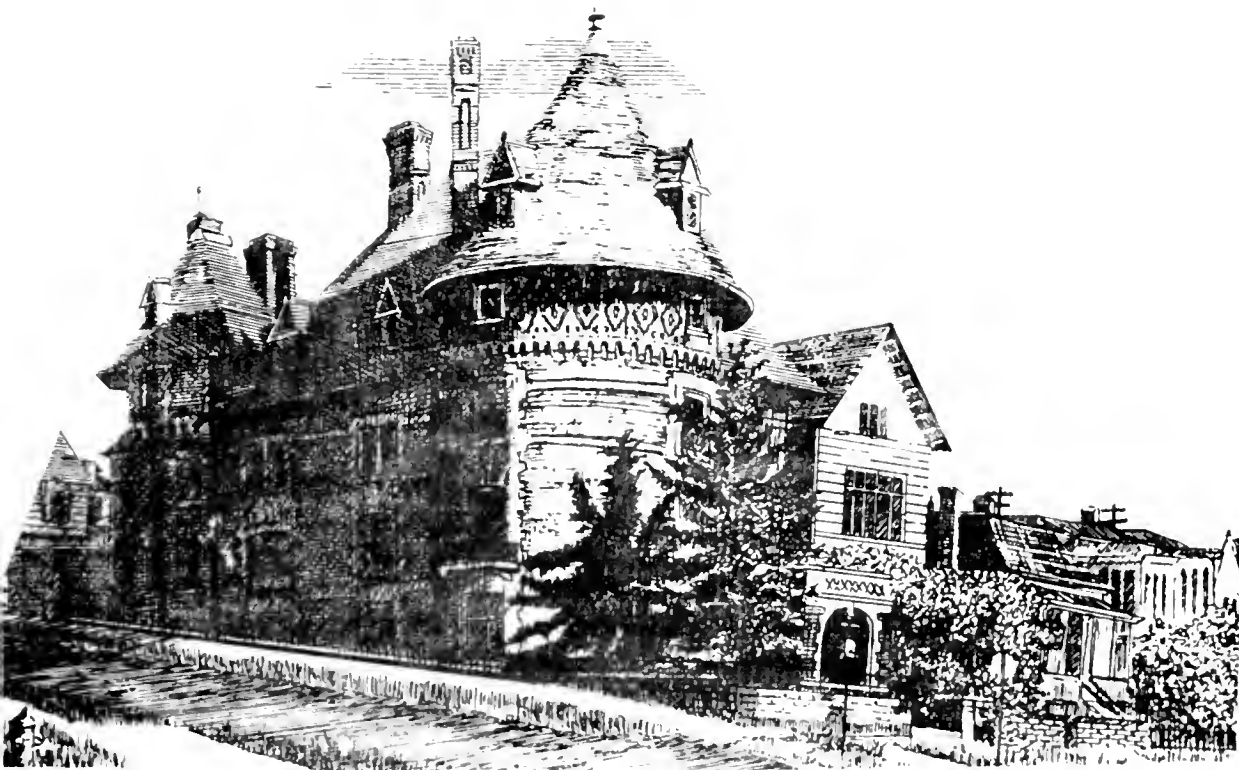
Montana Public Service Commission

Many others have contributed to the energy program, and their time and support is greatly appreciated. Thank you for your continued support.

Special thanks to Kathy Driscoll for contributed artwork, to Kris Ellingson for cover design, to Bill Black for graphics design, to Christina Coleman and Joy Davis for typing and layout work, to the National Center for Appropriate Technology for publication assistance, and to the Montana State Energy Office for the energy grant that has made this program possible.

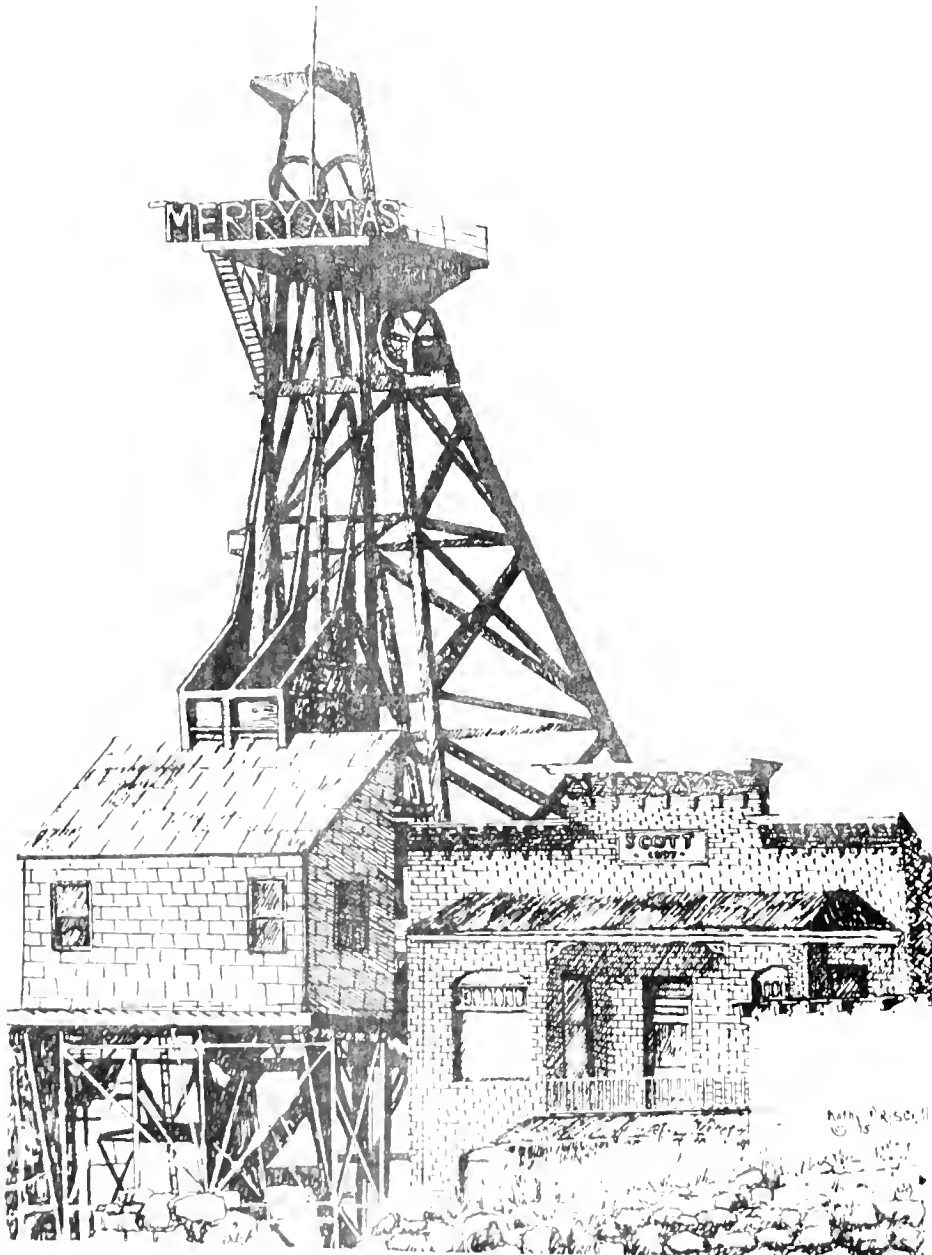
## TABLE OF CONTENTS

	<u>PAGE</u>
PART I: INTRODUCTION	1
A Brief Look at the Problem	1
The Birth of Community Energy Management in Butte-Silver Bow	2
What Is An Energy Use Profile	3
PART II: ENERGY DATA COLLECTION & ANALYSIS	3
Total Energy Consumption for Butte-Silver Bow	4
Butte-Silver Bow Government Energy Consumption	9
Government Energy Costs-Past, Present & Future 1978-1990	9
PART III: PLOTTING A COURSE FOR ENERGY EFFICIENCY	25
30% Savings for Buildings & Vehicle Fleet	25
General Recommendations	26
Savings in Government Buildings	28
Specific Energy Conservation Investments	29
Additional Energy Conservation Measures	34
PART IV: ACTIVITIES ACCOMPLISHED BY THE BUTTE-SILVER BOW ENERGY OFFICE	37
Education/Public Information	37
Technical Assistance/Research	38
Financial	40



# LIST OF TABLES & GRAPHS

	<u>PAGE</u>
1-A Historical Energy Data 1960-1981	5
1-B Butte-Silver Bow Gasoline Consumption	6
1-C Butte-Silver Bow Energy Consumption & Cost 1969,79,89	7
1-C-a Energy Costs-1969,79,89	8
2-A Energy Consumption for Butte-Silver Bow Government Facilities	10
2-B Energy Consumption-Volunteer Fire Stations	12
2-C Natural Gas Price Forecast	13
2-D Electricity Price Forecast	14
2-E Government Facilities-Energy Costs & Possible Savings	15
2-E-a Energy Costs & Savings	16
2-F Butte-Silver Bow Fuel Consumption	18
2-G Historic & Projected Energy Consumption & Cost	19
2-G-a Annual Energy Expenditures	20
2-H Historical & Projected Energy Costs 1978-1990	21
2-H-a Government Annual Energy Expenditures	22
2-H-b Government Projected Energy Costs 1981-1990	23
2-I Projections for Fiscal Year 1982-1983	24



## APPENDICES

	<u>PAGE</u>
A-1 Butte-Silver Bow Employees 1977-1982	42
A-2 Gas, Water & Electric Service in Silver Bow County	43
A-3 Resolution Establishing Energy Policy	44
B-1 Heating Degree Day, 30 Year Average for Montana's Ten Largest Cities	45
B-2 Heating Degree Days in Butte, Monthly Averages 1978-1981	46
C Community Energy Management Advisory Committee	47
D Solar Radiation Map of Montana	48
E Energy Consumption Data for Government Facilities: Civic Center, Courthouse & Jail, Metro Sewer Plant, Library, Public Safety Building, Stodden Park, Air- port Terminal, Community Center 1978, 79, 80, & 81	49
F Government Buildings-Natural Gas-BTU Energy Consumption	65
G Government Buildings-Electricity-BTU Energy Consumption	66
H Butte Schools Energy Data	67
I Butte-Silver Bow Organizational Chart	73

BUTTE-SILVER BOW GOVERNMENT  
ENERGY MANAGEMENT PROGRAM

PART I: INTRODUCTION

In the spring of 1980, an innovative Energy Management Program was initiated through the combined efforts of the National Center for Appropriate Technology (NCAT) and the Butte-Silver Bow Government. A full-time staff made up of employees from NCAT and the local Government embarked upon the challenge of moving Butte-Silver Bow on to a course of energy efficiency. Many organizations and individuals were encouraged to cooperate, and their continued support has been vital to the progress of the program. The Montana Power Company, Human Resource Council, Montana Energy Research and Development Institute, Montana Tech, the Butte Public School District No. 1, the Chamber of Commerce, the North American Indian Alliance, the Anaconda Copper Company, and various departments of the Butte-Silver Bow Government, along with many interested individuals, have contributed to make this program a truly community-wide effort.

The energy program was developed out of direct response to rapidly rising energy costs and the related problems that affect the local Government and the entire community. The Butte-Silver Bow Government, with full support of the Council of Commissioners, perceived the need for such a program and set out to formulate an energy management plan that would address the problems of: 1) Local Government Energy Efficiency (internal), and 2) Community-Wide Energy Efficiency (external). This report is the first in a two-part series and deals specifically with the local Government.

A Brief Look At The Problem

Energy is a vital component of an effective, functioning community. The era of readily available cheap energy has abruptly ended, and the cost to individuals, businesses, industry and government will continue to rise. Because energy was cheap and abundant, many of our buildings and systems were designed to use energy in a very wasteful manner. No longer can we afford to waste energy, valuable resources and money.

As energy costs rise faster than most other goods and services and significantly higher than inflation, the problem comes to life. Energy costs demand a larger share of the budget of the local Government and a larger share of an individual's disposable income. More money goes to energy leaving less money for other vital services. The local Government is then faced with the dilemma of raising taxes, cutting services or a combination of the two.

It is most important to realize that the solutions do exist for cutting energy waste and increasing energy efficiency in the Butte-Silver Bow Government. It is, however, going to take a firm commitment from local Government department heads, elected officials and all employees.



Problems and specific solutions do exist and will be presented in greater detail in following sections.

### The Birth of Community Energy Management in Butte-Silver Bow

Jim Benson, of the Institute for Ecological Policies in Fairfax, Virginia and the co-author of the County Energy Plan Guidebook spent two weeks in Butte in April-May, 1980. Mr. Benson, on contract with NCAT, helped to design the foundation of the Butte-Silver Bow Community Energy Management Program. NCAT appointed Tom Pelletier, Community Energy Management Specialist, as the project coordinator with the approval of Don Peoples, Butte-Silver Bow Chief Executive. An Advisory Committee was formed with representatives from business, industry, government, research, historical preservation, education, the media, low-income and the utility company. After several meetings and the dissemination of educational materials to the public, a work plan was developed with goals and objectives.

The energy team, made up of employees from NCAT and Butte-Silver Bow, worked on collecting, assimilating and analyzing energy use data for all sectors of Butte-Silver Bow. A great deal of effort was put into organizing, educating and informing the general public of energy problems and solutions. Butte-Silver Bow assumed the role as the leader in energy conservation in the County. The Butte-Silver Bow Government decided that it would get its own energy house in order and serve as an example of energy efficiency for the rest of the community. An Energy Office was opened on the first floor of the Courthouse to serve the people of Butte with free literature and technical assistance. The service was expanded to the Butte Public Library in order to serve the people more fully. The Library now has many new books dealing with various energy topics and about 40 films on energy which are available to the public.

The Butte-Silver Bow Community Energy Management Program submitted an application for a grant from the Montana Energy Extension Service. The proposal was successful and a grant for \$20,000 was awarded to Butte-Silver Bow for one year with a \$10,000 supplemental grant for the following six months. The grant made it possible to fund a full-time Energy Coordinator and open up a full-time Energy Office in the Courthouse. Tom Pelletier, part-time Energy Coordinator on loan from NCAT, was awarded the position and continuity was maintained in the program. The Energy Coordinator's position was established directly under the Chief Executive's Office and reports to the Chief Executive and the Council of Commissioners.

The challenge made upon the Butte-Silver Bow Energy Office is to increase the energy efficiency of the Government facilities and operations and to encourage energy efficiency in all sectors of the community. Additional funding from the Butte-Silver Bow Government with in-kind services donated from NCAT, the Montana Power Company and the Human Resource Council have combined to make the energy program a shining example of community cooperation and energy efficiency.

## What Is An Energy Use Profile

This Energy Use Profile is presented in an attempt to give complete documentation of Butte-Silver Bow's energy consumption over a period of years. In most cases, energy consumption data is available on an historical basis from 1978 to 1981 with general energy flow data available back to 1960. Projections have been made out to the year 1990 in order to give estimated figures on energy costs in the near future.

Energy consumption data is presented accordingly:

Electricity--measured in KWH (kilowatt hours).

Natural Gas--measured in MCF (thousands of cubic feet).

Motor Fuels--gasoline and diesel measured in gallons.

Propane--measured in gallons.

An analysis of each building and facility has been conducted for Butte-Silver Bow. The actual amount of electrical energy and natural gas has been recorded, and the cost per year of each facility has been analyzed. Energy audits have been completed on the major buildings to provide valuable information about the way a particular building uses its energy and to pinpoint energy saving measures. An energy audit requires an on-site examination of the facility with a focus on the structural design and orientation of the building, floor space, heating system, ventilating system, wattage of light bulbs, window area, building material, etc.

The Energy Use Profile takes into account the past and present energy bills and makes projections in order to show future costs of energy. The importance of this study is in showing the seriousness of energy cost escalation and to prove that energy conservation investments are not only worthwhile, but very necessary to the proper functioning of the local government in the future.

## PART II: ENERGY DATA COLLECTION AND ANALYSIS

Energy consumption data has been collected and analyzed for over two years for Butte-Silver Bow. The Budget Office is now recording all major energy accounts by computer, and we are now able to analyze each building's monthly energy consumption. Motor fuel consumption is also being recorded as the shipments of fuel are purchased and delivered. A mini-computer records all gasoline (regular and unleaded) as it is dispensed through the card key (Gas-Boy) gas pump system. All motor fuels are stored and dispensed in one location at the Maintenance and Service Center behind the Civic Center.

Accurate energy consumption data is extremely important to Butte-Silver Bow for several reasons:

1. for budgetary planning and forecasting;
2. for justification of energy conservation and renewable energy expenditures;
3. for accurate record keeping of actual energy costs;
4. for record keeping of savings due to energy conservation measures; and
5. for early detection of abnormal increases or decreases in energy consumption.

In the past, energy costs were a small part of the overall budget of Butte-Silver Bow. Every year, energy costs are increasing and taking a larger percentage of the available budget. An understanding of energy consumption and future energy costs is vital for effective planning and to the future of our community.

#### Total Energy Consumption For Butte-Silver Bow

Table 1-A presents energy consumption and revenue generated by the Montana Power Company in the Butte area. The number of customers, the amount of natural gas and electricity consumed, and the total revenue generated is all accurately presented. The number of customers has been fairly consistent, while there has been sharp decreases in natural gas consumption and the definite steady increases in electricity consumption.

Table 1-B shows the number of registered vehicles in Silver Bow County and the number of gallons of gasoline sold in the county. Generally, vehicle registrations have increased, meaning there are more vehicles (passenger cars and trucks) in the county. The amount of gasoline sold in the county had increased from 1960 to 1971 when it peaked out at 25,284,652 gallons. Since 1971, there has been a steady decrease of gallons of gasoline sold in Butte.

It is important to understand the energy consumption patterns in the Butte-Silver Bow area in order to place the government energy expenditures into the right perspective. For not only are we talking about a problem being faced by the local government, but it is a problem that all consumers are faced with. The entire community will be more and more affected each year as is pointed out in Table 1-C. The energy consumption data and cost figures for 1979 are accurate, while 1960 numbers are actual cost figures based on the 1979 levels of consumption. The 1989 figures are estimates based on the same level of consumption as 1979. The large increase from \$20 million to over \$202 million in 20 years brings up many serious problems for our local economy.

# HISTORICAL ENERGY DATA 1960-1981

NATURAL GAS					ELECTRICITY			
		NUMBER OF CUSTOMERS	MCF	TOTAL \$ REVENUE		NUMBER OF CUSTOMERS	KWH	TOTAL \$ REVENUE
1960	Res.	13,237	2,706,193	1,685,687		14,366	38,251,528	1,060,293
	Com.	1,188	1,108,944	519,464		1,594	31,998,705	677,447
	Ind.	83	934,888	296,688		152	11,716,179	180,445
	St. Light	----	-----	-----		89	2,671,163	72,661
	Pub. Auth.	2	63,296	17,114		1	313,400	4,545
1965	Res.	12,986	2,688,950	1,932,535		14,578	49,781,708	1,172,585
	Com.	1,109	1,070,609	574,491		1,524	30,837,496	758,095
	Ind.	86	909,006	335,039		132	11,837,496	169,179
	St. Light	----	-----	-----		109	3,310,431	86,351
	Pub. Auth.	2	61,935	20,220		1	370,800	5,039
1970	Res.	12,631	2,560,202	2,132,187		13,980	61,091,566	1,510,576
	Com.	1,028	1,078,450	650,693		1,397	53,321,975	1,109,205
	Ind.	74	889,571	342,920		119	6,841,218	152,418
	St. Light	----	-----	-----		112	3,846,911	129,651
	Pub. Auth.	1	40,437	16,495		----	-----	-----
1975	Res.	12,992	2,611,742	3,320,309		14,530	78,205,565	2,013,125
	Com.	1,128	1,218,671	1,396,799		1,382	66,688,140	1,473,469
	Ind.	78	934,979	928,155		128	6,768,719	144,387
	St. Light	----	-----	-----		125	4,100,979	124,383
	Pub. Auth.	1	51,709	46,890		----	-----	-----
1979	Res.	11,577	2,160,223	5,387,434		14,428	89,694,094	2,588,706
	Com.	1,103	1,034,933	2,420,684		1,442	75,399,756	1,956,044
	Ind.	66	694,302	1,643,503		123	12,218,369	256,761
	St. Light	----	-----	-----		129	4,256,389	148,351
	Pub. Auth.	1	43,952	91,450		----	-----	-----
1980	Res.	12,513	1,961,148	5,826,420		14,467	91,547,853	2,635,104
	Com.	1,055	958,156	3,082,102		1,428	77,650,022	2,001,054
	Ind.	59	777,739	2,578,787		120	24,142,791	445,852
	St. Light	----	-----	-----		127	4,295,590	166,003
	Pub. Auth.	1	50,146	165,644		----	286,630	148,756
1981	Res.	12,298	1,724,306	6,268,812		14,324	90,433,885	3,031,784
	Com.	1,072	841,103	3,383,210		1,440	78,998,230	2,364,357
	Ind.	59	735,868	3,236,366		120	27,595,012	569,773
	St. Light	----	-----	-----		127	4,295,590	166,003
	Pub. Auth.	1	46,376	192,112		----	-----	-----

\* Montana Power Company

\*\* Industrial does not include special use customers (Anaconda Co. and Taft-Hartley Co. local)

BUTTE-SILVER BOW GASOLINE CONSUMPTION

YEAR	NUMBER VEHICLES REGISTERED*	GALLONS SOLD BY DISTRIBUTORS/BUTTE (X)/**	GALLONS/ VEHICLE (average)	VMT#	MPG
1960	19,936	10,368,935	520		
1961	20,142	6,442,812	320		
1962	20,655	12,568,326	608		
1963	22,018	13,095,245	595		
1964	22,220	13,644,620	614		
1965	22,977	14,292,586	622		
1966	23,538	11,261,049	478		
1967	24,127	14,338,697	594	9,050	15.2
1968	23,408	14,595,276	624	9,140	14.6
1969	23,396	15,916,441	682	9,330	13.7
1970	24,223	19,771,350	816	9,850	12.1
1971	25,262	25,284,652	1001	9,930	9.9
1972	29,326	22,411,020	764	10,190	13.3
1973	28,476	21,300,477	748	10,030	13.4
1974	29,396	20,769,417	707	9,890	14.0
1975	30,120	17,189,343	571	9,290	16.3
1976	29,925	18,807,019	628	9,650	15.4
1977	33,327	19,004,165	570	9,120	16.0
1978	35,806	18,194,366	508	9,110	17.9
1979	32,170	16,993,381	523	9,363	17.9
1980	32,818	15,933,938	486	8,796	18.1

Avg. 9,485 Avg. 14.8

\* Montana Registrar of Motor Vehicles (Represents number of cars and trucks in Silver Bow County)

(X) Montana Petroleum Association and Montana Motor Fuels Tax Division

# Montana Department of Highways (VMT=Vehicle Miles Traveled, average)

\*\* The gallon figures are for regular and unleaded gasoline and do not include diesel fuel.

## BUTTE/SILVER BOW ENERGY CONSUMPTION &amp; COST (ESTIMATES)

1979 (Actual)

\$20,400,000	Gasoline (17 million gallons at \$1.20/gallon)
9,785,000	Fuel Oil (12.64 million gallons at .77/gallon)*
114,000	LPG (190,000 gallons at \$.60/gallon)
2,590,000	Residential Elect. (89.7 million kwh at \$.0282/kwh)
2,104,000	Commercial Elect. (79.6 million kwh at \$.0257/kwh)
7,278,000	Industrial Elect. (909.7 million kwh at \$.008/kwh)
5,390,000	Residential Nat. Gas (2.2 million MCF at \$2.46/MCF)
2,512,000	Commercial Nat. Gas (1.08 million MCF at \$2.46/MCF)
2,761,000	Industrial Nat. Gas (1.16 million MCF at \$2.38/MCF)
<u>\$52,934,000</u>	

1969 (Assuming level of consumption  
is the same as 1979)

\$ 6,800,000	Gasoline (17 million gallons at \$.40/gallon)
3,160,000	Fuel Oil (12.64 million gallons at \$.25/gallon)*
47,500	LPG (190,000 gallons at \$.25/gallon)
1,884,000	Residential Elect. (89.7 million kwh at \$.0210/kwh)
1,536,000	Commercial Elect. (79.6 million kwh at \$.0193/kwh)
3,730,000	Industrial Elect. (909.7 million kwh at \$.0041/kwh)
1,940,000	Residential Nat. Gas (2.2 million MCF at \$.882/MCF)
694,000	Commercial Nat. Gas (1.08 million MCF at \$.643/MCF)
392,000	Industrial Nat. Gas (1.16 million MCF at .338/MCF)
<u>\$20,183,500</u>	

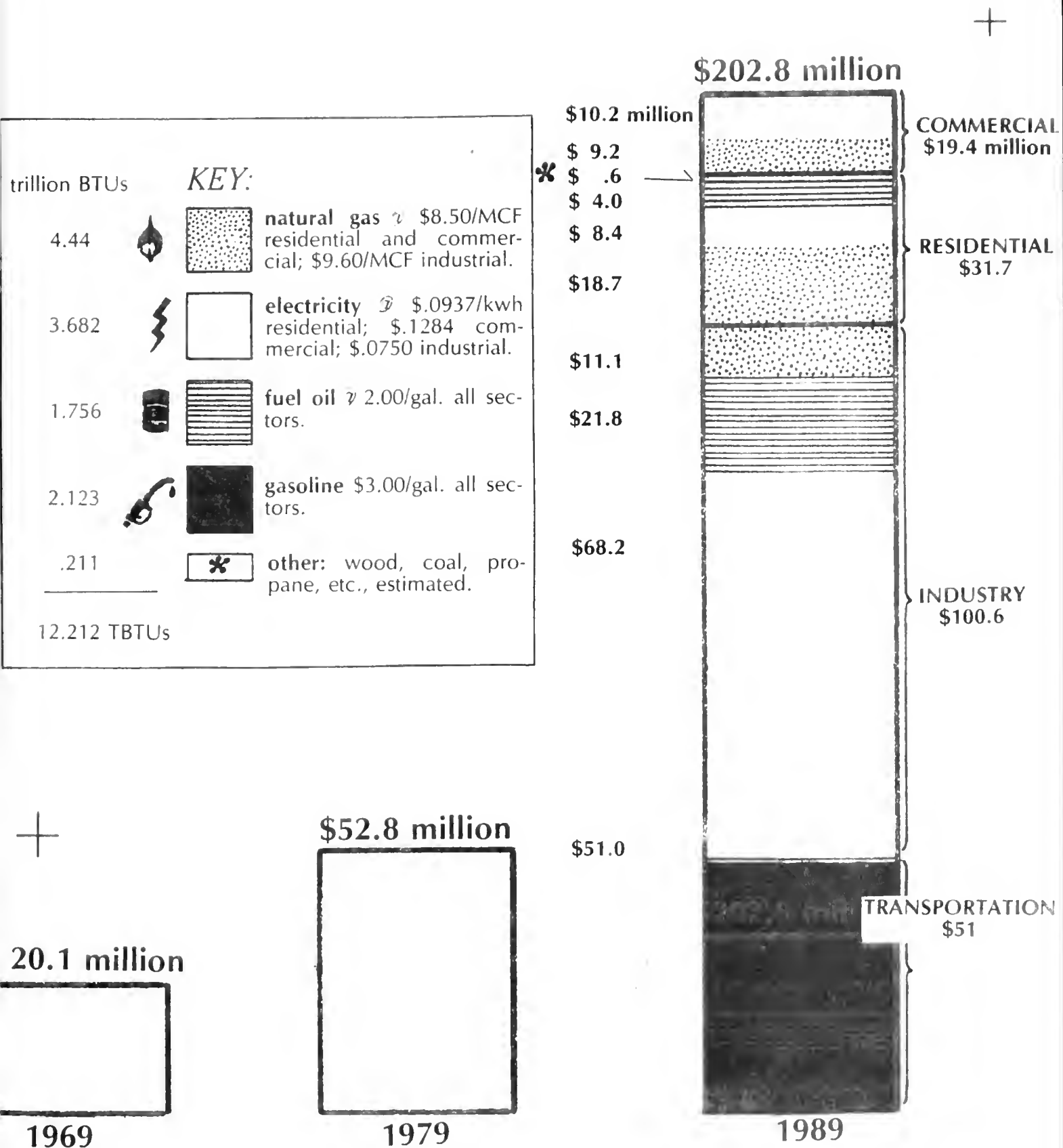
1989 (1979 consumption level, estimated  
1989 Prices)

\$51,000,000	Gasoline (17 million gallons at \$3.00/gallon)
25,280,000	Fuel Oil (12.64 million gallons at \$2.00/gallons)*
323,000	LPG (190,000 gallons at \$1.70/gallon)
8,405,000	Residential Elect. (89.7 million kwh at \$.0937/kwh)
10,221,000	Commercial Elect. (79.6 million kwh at \$.1284/kwh)
68,227,000	Industrial Elect. (909.7 million kwh at \$.0750/kwh)
18,700,000	Residential Nat. Gas (2.2 million MCF at \$8.50/MCF)
9,180,000	Commercial Nat. Gas (1.08 million MCF at \$8.50/MCF)
11,136,000	Industrial Nat. Gas (1.16 million MCF at \$9.60/MCF)
<u>\$202,472,000</u>	

\*Includes Anaconda diesel fuel consumption. Does not include fuel - wood costs.

Sources: Montana Power Company, "Montana Historical Energy Statistics," Dept. of Nat. Resources and Conservation; Montana Petroleum Association; Montana State Energy Office; Local gasoline & fuel dist.; Montana Public Service Commission.

## ENERGY COSTS 1969, 79, 89



## Butte-Silver Bow Government Energy Consumption

Table 2-A is presented in order to document energy consumption for Butte-Silver Bow government facilities. Accurate information is available on most of the facilities from 1978 to 1981. The energy consumption data and costs have been presented by calendar year totals. These figures can easily be adjusted to reflect fiscal year totals. A breakdown of the energy consumption of the nine volunteer fire stations is presented for 1981 in Table 2-B.

Projections for natural gas and electricity costs (2-C & 2-D) are based on forecasting done by the Montana Power Company and presented to the Montana Public Service Commission in 1982. Projections for 1982-1990 are based on the same level of consumption as 1981. Since 1981 was a mild year for weather and heating needs were low, it is possible that the projected energy consumption could be higher during a severe heating season. These projections are based on the assumption that the efforts made by the Energy Management Program and the increased awareness of the Butte-Silver Bow employees will reduce unnecessary energy waste.

Holding energy consumption at 1981 levels is one thing, but as the Tables clearly point out, the costs of that energy in future years will be increasingly difficult on the local government budget. One must keep in mind that these figures will be drastically affected by the closing of facilities such as the selling of Silver Bow General Hospital or the addition of any new facilities such as the new Asphalt Recycling Plant.

## Government Energy Costs Past, Present & Future 1978-1990

Virtually all of the government facilities can be improved for energy efficiency. There are many ways to tighten up the buildings, improve heating system efficiency, upgrade energy management practices, and incorporate new technological developments for the purpose of energy efficiency, and saving money. An investment will have to be made to achieve significant energy efficiency levels of operation. A 30% reduction in present levels of energy consumption is possible through complete weatherization of all buildings and increased efficiency of all systems. Table 2-E presents actual energy costs for 1978 to 1981 with projections for 1982 to 1990. An estimated 30% reduction in energy consumption for accumulated savings could be very significant and can prove the value of investing in energy conservation measures. Accumulated energy savings from 1983-1990 could be more than \$1,750,000 if a thorough energy conservation program was implemented in buildings and facilities. Additional savings could be possible through energy efficiency efforts in street lighting and vehicle management.

The energy projections for costs and savings on Table 2-E are only for buildings and facilities. The picture for future energy costs gets more serious when we consider motor fuel consumption (gasoline and diesel) and calculate in the projections based on U.S. Dept. of Energy forecasts. D.O.E. estimates motor fuels to increase by 15% per year from 1982-85 and 12% per year from 1986-90. The same forecast is assumed for propane. If fuel consumption remains constant at the 1981 level of 173,361 gallons, the price increases will drastically affect Butte-Silver Bow's budget. Graphs are used to more clearly show the impact of escalating energy prices.



ENERGY CONSUMPTION FOR BUTTE-SILVER BOW  
GOVERNMENT FACILITIES

BUILDING	YEAR	KW ELECTRICAL CONSUMPTION	\$ COST	MCF NATURAL GAS CONSUMPTION	\$ COST	TOTAL \$ COST
Courthouse	78	293,506	7,349.16	15,757.0	29,756.44	37,105.60
	79	348,302	8,278.19	13,876.0	29,168.06	37,446.25
	80	350,031	8,392.76	12,527.0	40,462.52	48,855.28
	81	311,890	9,156.99	10,721.0	48,236.14	56,393.13
Civic Center	78	544,800	12,267.80	13,284.0	25,076.03	37,343.83
	79	702,720	14,157.19	12,164.0	25,825.40	39,982.59
	80	722,880	14,909.83	11,623.0	37,247.30	52,157.13
	81	643,840	16,757.97	9,260.0	38,961.60	55,719.57
Community Center	78	116,480	3,391.51	3,271.8	6,843.38	10,234.89
	79	126,720	3,639.04	3,443.6	7,928.14	11,567.18
	80	117,360	3,453.27	2,765.8	9,012.62	12,465.89
	81	113,560	4,054.73	2,499.2	10,440.34	14,495.07
Fire Station #2	78	52,440	1,930.63	817.2	1,933.82	3,864.45
	79	58,716	2,112.24	814.2	2,024.10	4,136.34
	80	56,496	2,023.18	741.2	2,378.82	4,402.00
	81	56,460	2,376.10	723.8	2,970.79	5,346.89
Archives	78	5,128	246.64	615.2	1,404.50	1,651.14
	79	3,640	175.53	13.4	32.82	208.35
	80	4,483	214.02	202.6	685.63	899.65
	81	2,664	158.30	173.8	683.94	842.24
Library	78	73,200	2,494.95	1,586.8	3,560.10	6,055.05
	79	68,088	2,334.58	1,670.8	4,094.47	6,429.05
	80	77,304	2,582.43	1,349.3	4,427.02	7,009.45
	81	66,888	2,818.65	1,017.4	4,228.48	7,047.13
Metro Sewer	78	1,681,200	23,626.58	1,801.0	3,960.44	27,587.02
	79	3,251,600	46,353.43	1,874.0	4,412.42	50,765.65
	80	5,437,200	75,438.58	1,674.0	5,331.55	80,770.13
	81	4,552,400	75,820.37	1,552.0	6,494.96	82,315.33
Public Safety	78	204,720	4,739.52	2,098.9	4,620.54	9,360.06
	79	217,520	5,082.81	2,004.3	4,741.14	9,823.95
	80	239,600	5,472.74	1,895.1	6,157.18	11,629.92
	81	228,800	6,293.35	1,481.2	6,150.09	12,443.44
Crusher Shack	81	36,640	2,139.37			2,139.37

ENERGY CONSUMPTION FOR BUTTE-SILVER BOW  
GOVERNMENT FACILITIES  
(continued)

BUILDING	YEAR	KW ELECTRICAL CONSUMPTION	\$ COST	MCF NATURAL GAS CONSUMPTION	\$ COST	TOTAL \$ COST
Stodden Park Pool	78	72,780	2,220.46	3,055.0	6,385.53	8,605.99
	79	70,800	2,198.58	3,022.0	6,912.54	9,111.12
	80	64,020	2,116.64	2,719.0	9,176.09	11,292.72
	81	61,980	2,418.02	2,019.0	9,915.95	12,333.97
SilverBow General Hospital	78	1,288,800	20,009.80	33,186.0	61,218.80	81,228.60
	79	1,347,900	21,598.97	36,109.0	75,048.14	96,647.11
	80	1,326,300	21,430.44	34,675.0	113,731.16	135,161.60
Sold March 1982						
Airport (Terminal, Maintenance Garage)	78	366,720	8,029.74	3,137.0	7,175.58	15,205.32
	79	337,360	7,792.62	3,569.8	8,494.74	16,287.36
	80	364,707	8,388.61	4,936.0	15,984.30	24,372.91
	81	342,604	9,536.93	4,726.5	19,830.63	29,367.56
3030 Oregon (Old Club House)	78	1,721	91.82	214.7	540.44	632.26
	79	2,269	115.44	196.6	524.63	640.07
	80	2,262	114.50	222.0	695.49	809.99
	81	2,225	134.15	162.4	631.18	765.33
Clark Park	81		2,045.52		342.39	2,387.91
Home Health Agency Stewart & Argyle	78	6,388	302.82	1,404.8	3,181.93	3,484.75
	79	6,767	313.50	1,344.8	3,234.69	3,548.19
	80	6,345	296.37	1,109.9	3,582.50	3,878.87
	81	7,493	410.28	1,144.5	4,741.93	5,152.21
Nine Volunteer Fire Stations	79	57,975	2,565.76	2,776.7	7,153.02	9,718.78
	80	46,211	2,181.04	2,449.3	7,646.91	9,827.95
	81	58,084	3,102.40	4,229.0	11,107.13	14,209.53
Maintenance & Service Center	80	233,280	5,536.74	2,256.1	7,356.30	12,893.04
	81	245,760	6,833.59	3,577.9	15,627.16	22,460.75
Stodden Park*	81		6,746.73			6,746.73
Total	78	4,707,883	86,701.43	80,479.4	155,657.53	242,358.96
	79	6,612,085	117,110.88	83,888.2	181,862.96	298,973.84
	80	9,048,479	152,551.15	81,145.3	263,875.38	416,426.53
	81	6,831,288	150,803.45	77,962.7	180,362.71	331,166.16

\*Lights and Water Pumps

BUTTE-SILVER BOW  
ENLGRY CONSUMPTION DATA

VOLUNTEER FIRE STATIONS - 1981

FIRE STATION	KW ELECTRICAL CONSUMPTION	\$ COST	MCF NATURAL GAS CONSUMPTION	\$ COST	TOTAL \$ COST
Boulevard	16,345	792.79	584.8	2,337.26	3,130.05
Centerville	4,164	247.40	422.0	1,597.93	1,845.33
Floral Park	1,471	93.85	103.9	357.69	451.54
Big Butte	3,818	215.24	375.8	1,479.04	1,694.28
Columbia Gardens	20	11.10	Closed		11.10
Racetrack	10,560	561.83	482.3	1,939.71	2,501.54
Terra Verde	5,320	292.80	249.7	945.45	1,238.25
Home Atherton	11,279	601.61	374.6	1,464.77	2,066.38
Rocker	5,107	285.78	1,635.9	985.28	1,271.06
TOTAL	58,084	3,102.40	4,229.0	11,107.13	14,209.53



THE MONTANA POWER COMPANY

NATURAL GAS PRICE FORECAST<sup>1</sup>  
1982 - 1991

YEAR	FIRM			UTILITY		
	REAL <sup>2</sup>	NOMINAL <sup>3</sup>	% <sup>4</sup>	REAL <sup>2</sup>	NOMINAL <sup>3</sup>	% <sup>4</sup>
1981	1.92	3.93	---	1.80	4.13	---
1982	2.14	4.45	13.2	1.89	4.61	11.6
1983	2.41	5.37	20.7	2.14	5.63	22.1
1984	2.50	5.96	11.0	2.19	6.26	11.2
1985	3.02	7.69	29.0	2.65	8.20	31.0
1986	3.04	8.29	7.8	2.65	8.84	7.8
1987	3.22	9.38	13.1	2.80	10.02	13.3
1988	3.37	10.46	11.5	2.93	11.21	11.9
1989	3.49	11.53	10.2	3.05	12.41	10.7
1990	3.56	12.54	8.8	3.12	13.52	8.9
1991	3.61	13.50	7.7	3.17	14.58	7.8

<sup>1</sup>All prices are in \$/Mcf. The firm price is forecasted on the basis of the pressure base equivalent cost of the interruptible class.

<sup>2</sup>"Real" refers to the prices being stated in terms of 1972 dollars. That is, general inflation has been removed and 1972 is the base year of the index (i.e., 1972 = 1.00). The Implicit Price Deflator for Personal Consumption was used as the index for the Residential class while the Producer Price Index for Finished Goods was used for the utility class. The forecasts for both indices were obtained from Data Resources, Inc.'s "U.S. Long Term Review, Winter 1981-82."

<sup>3</sup>"Nominal" refers to actual dollars or dollars from which inflation has not been removed.

<sup>4</sup>The "%" column refers to the year to year change in nominal prices.

THE MONTANA POWER COMPANY

ELECTRICITY PRICE FORECAST<sup>1</sup>  
1982 - 1991

YEAR	RESIDENTIAL			GENERAL SERVICE		
	REAL <sup>2</sup>	NOMINAL <sup>3</sup>	% <sup>4</sup>	REAL <sup>2</sup>	NOMINAL <sup>3</sup>	% <sup>4</sup>
1981	1.77	3.43	---	2.07	4.75	---
1982	1.73	3.60	5.0	2.04	4.99	5.1
1983	1.89	4.21	16.9	2.22	5.84	17.0
1984	2.25	5.36	27.3	2.64	7.55	29.3
1985	2.60	6.63	23.7	3.04	9.40	24.5
1986	2.65	7.22	8.9	3.09	10.30	9.6
1987	2.63	7.65	6.0	3.08	11.04	7.2
1988	2.62	8.13	6.3	3.06	11.68	5.8
1989	2.60	8.59	5.7	3.03	12.35	5.7
1990	2.59	9.11	6.1	3.01	13.05	5.7
1991	2.58	9.64	5.8	3.00	13.78	5.6

<sup>1</sup>All prices are in cents/kWh. The Residential prices are calculated on the basis of 500 kWh/month and General Service prices are calculated assuming 2,400 kWh/month.

<sup>2</sup>"Real" refers to the prices being stated in terms of 1972 dollars. That is, general inflation has been removed and 1972 is the base year of the index (i.e., 1972 = 1.00). The Implicit Price Deflator for Personal Consumption was used as the index for the Residential class while the Producer Price Index for Finished Goods was used for the General Service class. The forecasts for both indices were obtained from Data Resources, Inc.'s "U.S. Long Term Review, Winter 1981-82."

<sup>3</sup>"Nominal" refers to actual dollars or dollars from which inflation has not been removed.

<sup>4</sup>The "%" column refers to the year to year change in nominal prices.

BUTTE-SILVER BOW GOVERNMENT FACILITIES  
ENERGY COSTS AND POSSIBLE ENERGY EFFICIENCY SAVINGS  
1978-1990

Calendar Year	Electricity \$	Natural Gas \$	Total Cost \$	Possible Energy Efficiency Savings 30% of Total	Accumulated Energy Efficiency Savings 1978-82/1983-90
*1978	\$ 86,701	\$155,658	\$242,359	\$ 72,708	\$ 72,708
1979	117,111	181,863	298,974	89,692	162,400
1980	152,551	263,875	416,427	124,928	287,328
**1981	<u>150,803</u>	<u>180,363</u>	<u>331,166</u>	99,350	386,678
***1982	158,494	204,171	362,665	108,799	<u>495,477</u>
1983	185,438	246,434	431,872	129,562	129,562
1984	239,772	273,542	513,314	153,994	283,556
1985	298,516	352,869	651,385	195,415	478,971
1986	327,174	380,392	707,566	212,270	691,241
1987	350,730	430,224	780,954	234,286	925,527
1988	371,072	479,700	850,772	255,232	1,180,759
1989	392,223	528,629	920,352	276,256	1,457,015
1990	414,580	575,148	989,728	296,918	1,753,933

\*1978-1981 present actual consumption cost figures

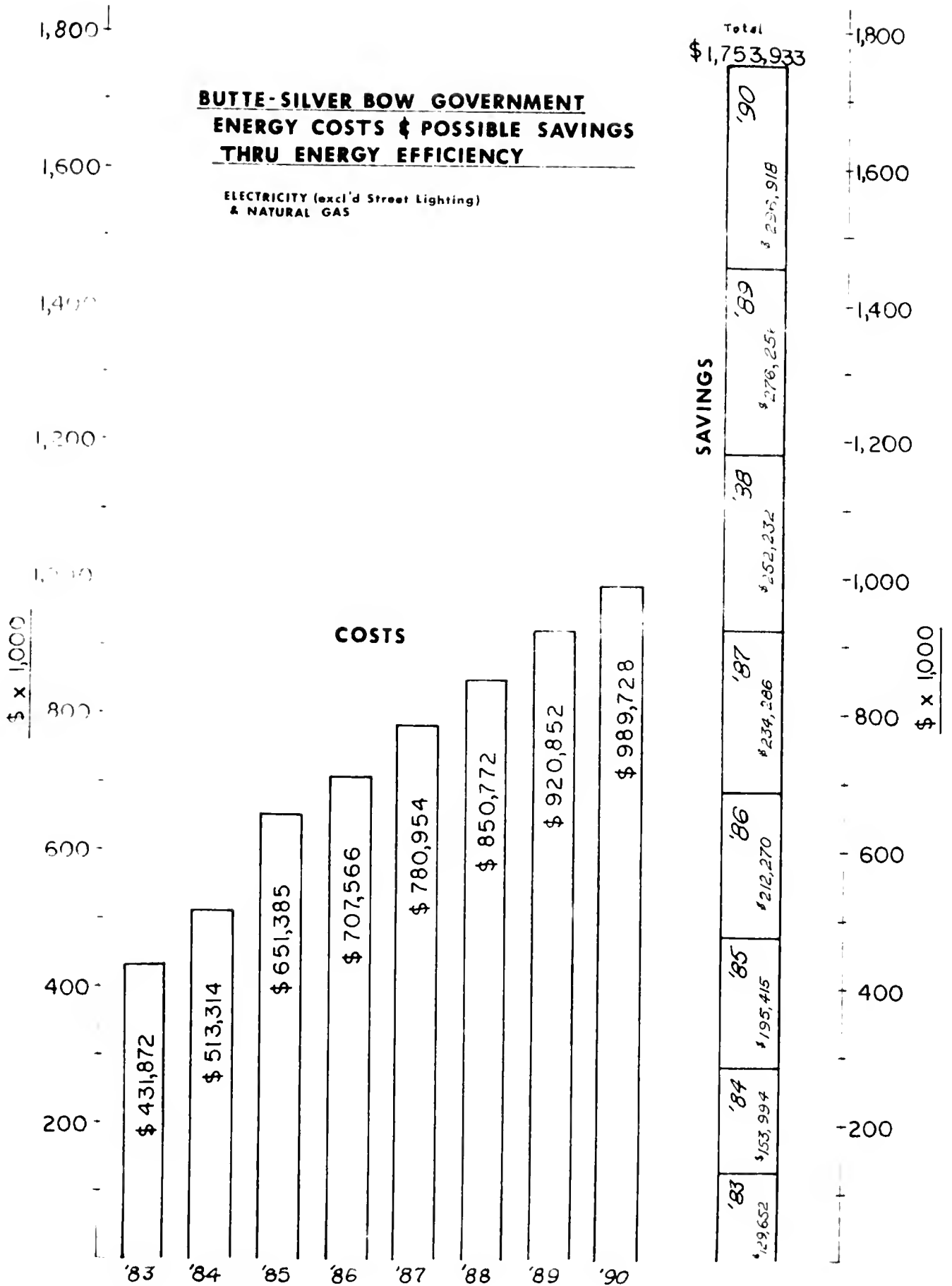
\*\*Cost decreases for 1981 reflect the selling of Silver Bow General Hospital

\*\*\*1982-1990 figures are projections based on Montana Power Company forecasted prices at the 1981 level of consumption.

This graph is presented in an attempt to show how serious energy costs will be in the future. If nothing is done to improve energy efficiency, the energy costs will be staggering. With the adoption of an overall energy efficiency program, at least 30 percent savings could be realized. The yearly savings and the accumulated savings columns present very impressive reasons for supporting energy efficiency efforts in Butte-Silver Bow.

Caution! Cost projections for 1982 through 1990 assume the same level of consumption as 1981.

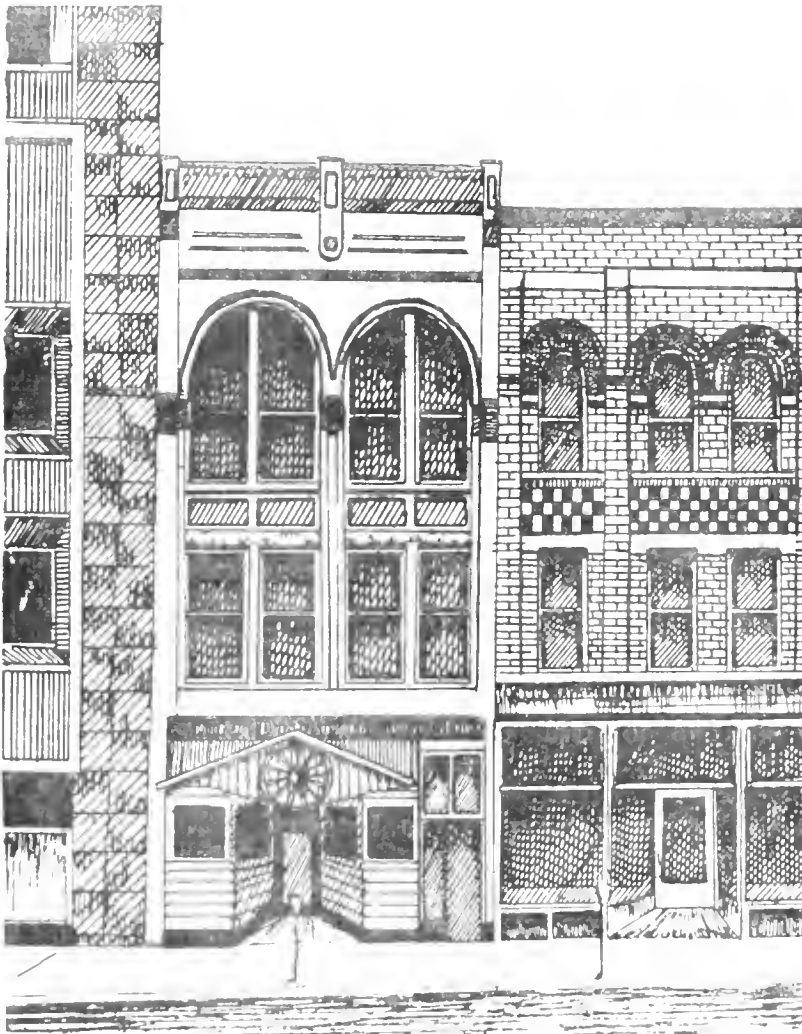
1981 was an unusually warm year with a total of 8,183 heating degree days compared to the average for Butte of 9,719 heating degree days. This would not have a big impact on electricity consumption but definitely has had a significant impact upon natural gas consumption. In order to meet these cost projections the level of consumption for electricity and natural gas will have to be kept under control and even cut back.



In Table 2-F, monthly totals for 1981 are presented for regular, diesel, and unleaded fuel. In Table 2-G, the total gallons of gasoline and diesel for 1981, 173,361, are figured in with other energy costs, and totals for each year are projected out to 1990. Propane costs are also figured into this table. For budgetary purposes, the energy costs for each facility have been calculated on a fiscal year basis. Table 2-I is presented to show the actual 81-82 fiscal year energy data for each of Butte-Silver Bow's major facilities. Projections for the 82-83 fiscal year are presented with estimated decreases in consumption and the calculated costs based on MPC projections for the year.

Street lighting costs must be added into the picture to provide the complete listing of Butte-Silver Bow's energy expenditures. Table 2-H presents street lighting costs (actual) for 1978-81 with projected costs to 1990 assuming the 1981 level of consumption. These projections are also based on Montana Power Company forecasts. When all energy costs are figured in together, the Butte-Silver Bow Government had to pay \$691,010 in 1981. The same amount of energy will cost about \$1,388,705 in 1985 and \$2,140,351 in 1990.

A serious effort will have to be made to reduce the level of consumption of all energy types by all departments. The economic stability of the Butte-Silver Bow Government is at stake.





LOCAL GOVERNMENT FUEL CONSUMPTION  
(GALLONS)

1981	Regular	Unleaded Gasoline	Diesel
January	4,463.72	2,949.79	6,884.5
February	5,141	2,928	6,335
March	4,651	3,071	6,524
April	5,276	4,128	6,524
May	5,107	3,972	5,601
June	7,016	3,973	6,558
July	6,948	3,691	5,671
August	5,829	3,119	3,708
September	5,755	4,078	4,412
October	5,299	3,313	3,880
November	4,032	3,022	3,709
December	5,447	3,964	6,381
Totals	64,964.72	42,208.79	66,187.5
Cost	(Avg. \$1.144 Gal.)	(Avg. \$1.186 Gal.)	(Avg. \$1.04 Gal.)
	<u>\$74,319.64</u>	<u>\$50,059.62</u>	<u>\$68,835.00</u>
1981 Total Gallons	173,361.00		
1981 Total Fuel Cost	<u>\$193,214.26</u>		
1980 ESTIMATED FUEL CONSUMPTION			
	Regular	Diesel	Total
Gallons	45,797	95,400	180,455
Cost	\$51,293	\$45,147	<u>\$187,070</u>

BUTTE-SILVER BOWHISTORIC AND PROJECTED ENERGY CONSUMPTION AND COST

<u>CALENDAR</u> <u>YEAR</u>	<u>ELECTRICITY</u>			<u>NATURAL GAS</u>		<u>GASOLINE &amp; DIESEL</u>		<u>PROPANE</u>		<u>TOTAL COST</u> <u>AND ANNUAL INCREASE</u>	
	<u>KWH</u>	<u>COST</u>	<u>MCF</u>	<u>COST</u>	<u>GALLONS</u>	<u>COST</u>	<u>GALLONS</u>	<u>COST</u>	<u>ANNUAL INCREASE</u>		
*1978	4,707,883	\$ 86,701	80,479.4	\$155,658							
1979	6,612,089	117,111	83,888.2	181,863							
1980	9,048,479	152,551	81,145.3	263,875	180,455	\$187,070				\$ 603,496	
*1981	6,794,648	150,803	77,962.7	180,363	173,361	193,214	841	\$ 627	525,007	-\$ 78,489	
***1982	6,794,648	158,494	77,962.7	204,171	173,361	222,196	850	638	585,490	+ 60,483	
1983	6,794,648	185,438	77,962.7	246,434	173,361	255,525	900	693	688,090	+ 102,600	
1984	6,794,648	239,772	77,962.7	273,542	173,361	293,854	900	747	807,915	+ 119,825	
1985	6,794,648	298,516	77,962.7	352,869	173,361	337,932	1,000	950	990,267	+ 182,352	
1986	6,794,648	327,174	77,962.7	380,392	173,361	378,484	1,000	1,090	1,087,140	+ 96,873	
1987	6,794,648	350,730	77,962.7	430,224	173,361	423,902	1,000	1,225	1,206,081	+ 118,941	
1988	6,794,648	371,072	77,962.7	479,700	173,361	474,770	1,000	1,372	1,326,914	+ 120,833	
1989	6,794,648	392,223	77,962.7	528,629	173,361	531,742	1,000	1,537	1,454,131	+ 127,217	
1990	6,794,648	414,580	77,962.7	575,148	173,361	595,551	1,000	1,720	1,586,999	+ 132,868	

Average Annual Increase \$117,299

1982-1990

\*1978 - 1981 figures are actual consumption and cost data.

\*\*1981 - Consumption and cost decreases reflect the selling of Silver Bow General Hospital.

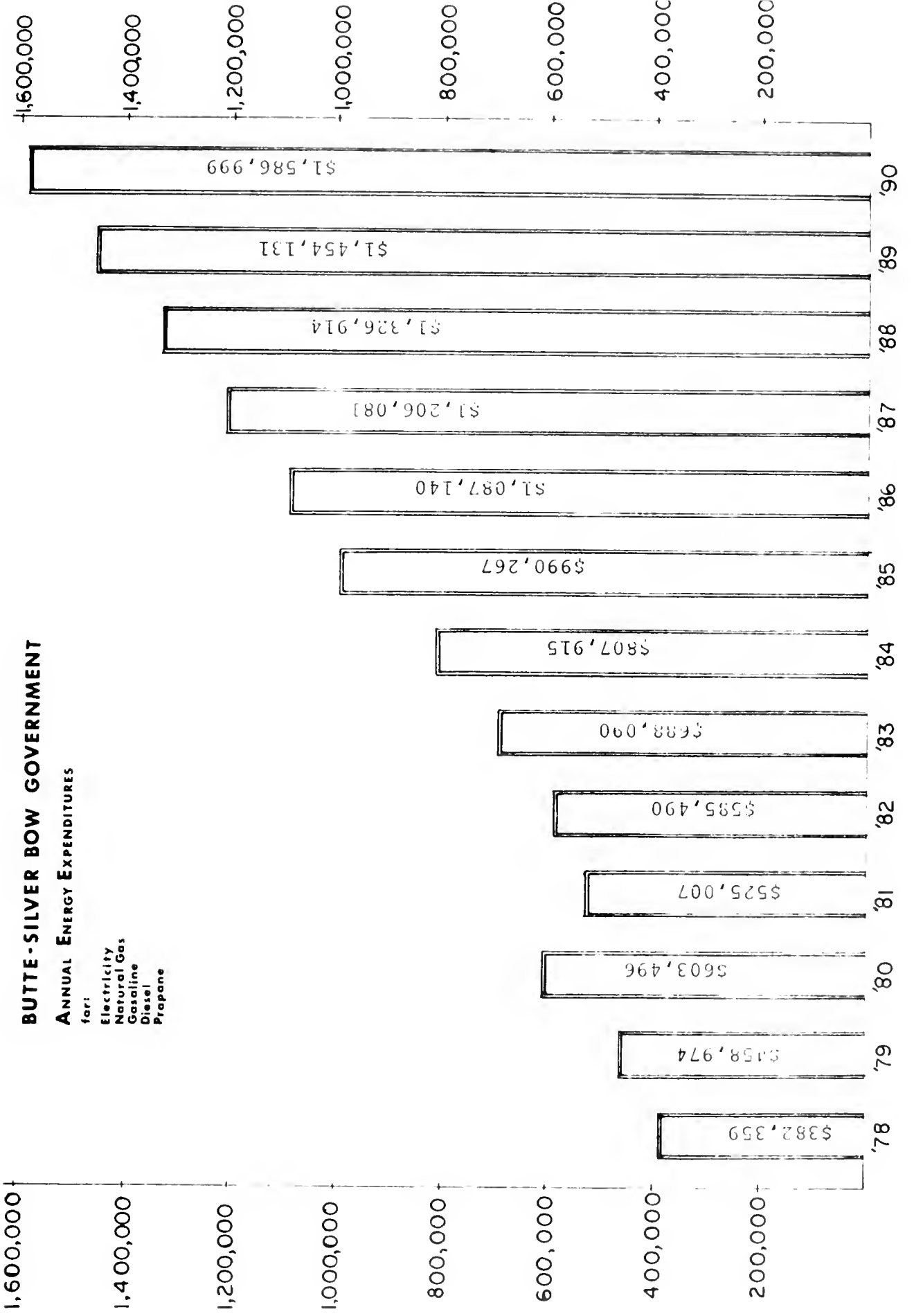
\*\*\*1982 - 1990 figures represent 1981 levels of consumption with projected energy costs based on 1982 Montana Power forecasts for natural gas and electricity and 1982 forecasts by the U. S. Dept. of Energy for gasoline, diesel and propane.

# BUTTE-SILVER BOW GOVERNMENT

## ANNUAL ENERGY EXPENDITURES

for:

Electricity  
Natural Gas  
Gasoline  
Diesel  
Propane



BUTTE-SILVER BOW  
HISTORIC AND PROJECTED ENERGY COSTS

1978-1990

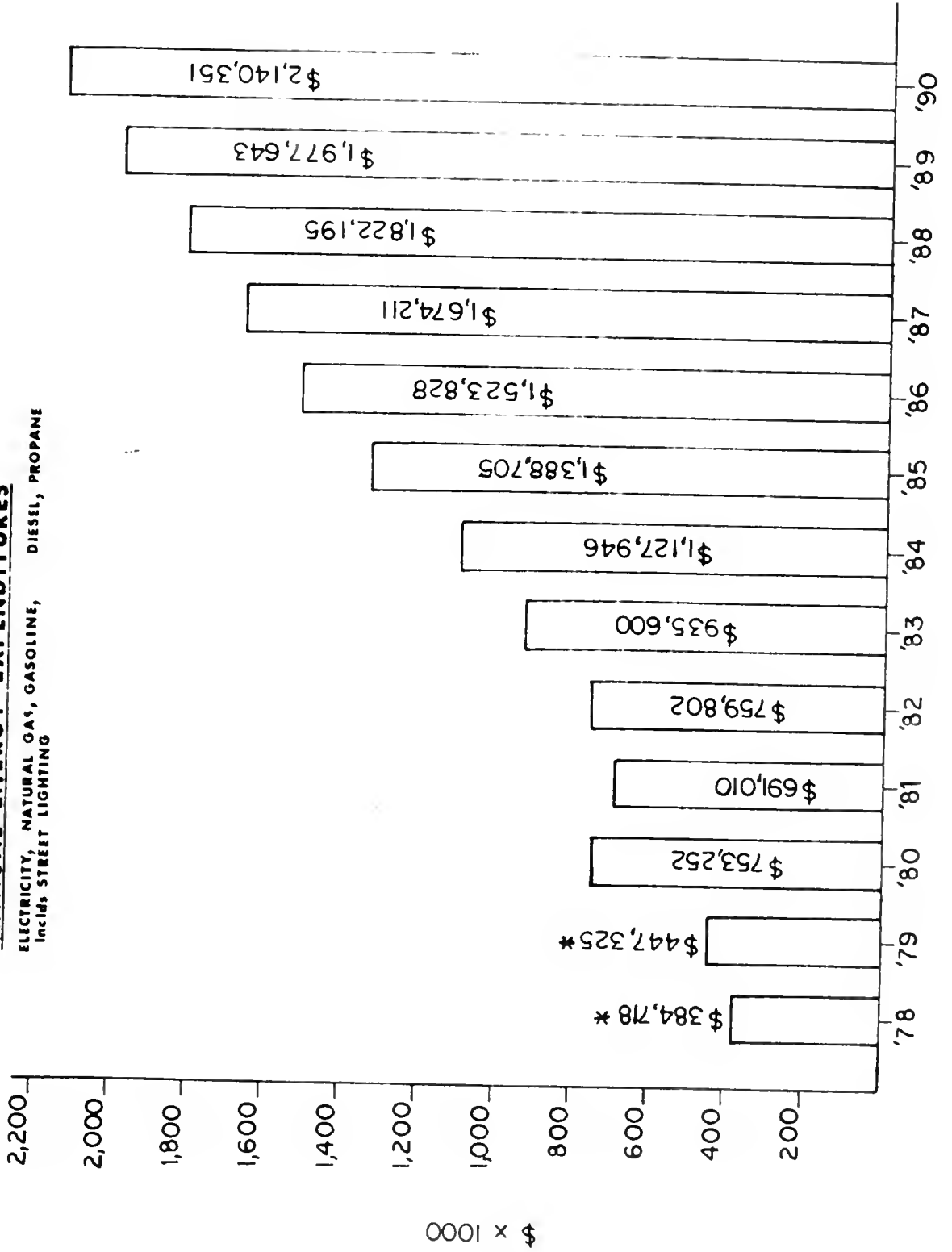
Calendar Year	Electricity	Natural Gas	Gasoline & Diesel	Propane	Street Lighting	Total
*1978	\$ 86,701	\$155,658			\$142,359	
1979	117,111	181,863			148,351	
1980	152,551	263,875			149,756	\$ 753,252
1981	150,803	180,363	\$187,070	\$ 627	166,003	691,010
**1982	158,494	204,171	222,196	638	174,303	759,802
1983	185,438	246,434	255,525	693	247,510	935,600
1984	239,772	273,542	293,854	747	320,031	1,127,946
1985	298,516	352,869	337,932	950	398,438	1,388,705
1986	327,174	380,392	378,484	1,090	436,688	1,523,828
1987	350,730	430,224	423,902	1,225	468,130	1,674,211
1988	371,072	479,700	474,770	1,372	495,281	1,822,195
1989	392,223	528,629	531,742	1,537	523,512	1,977,443
1990	414,580	575,148	595,551	1,720	553,352	2,140,351

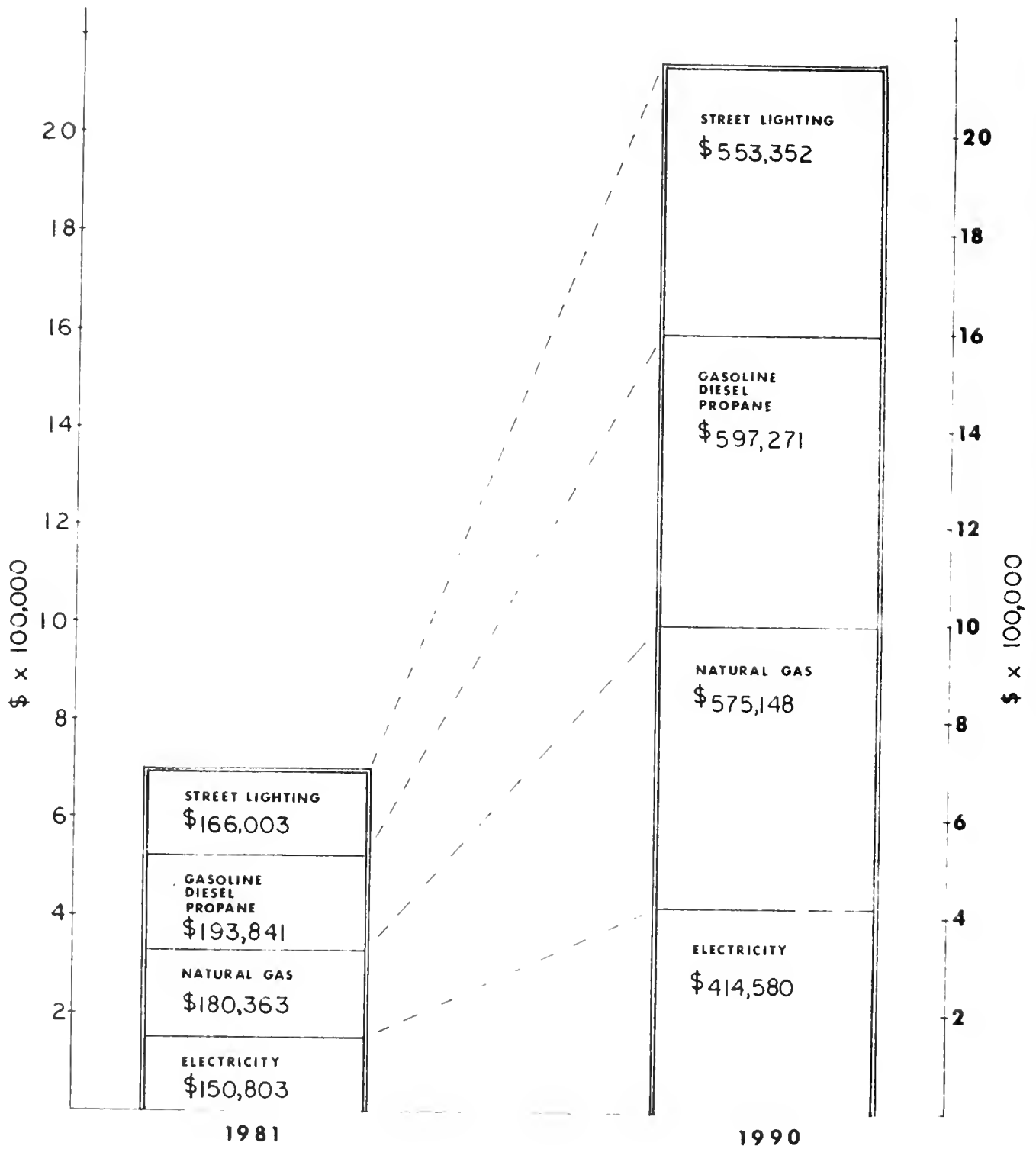
\*1978-1981 are actual energy expenditures.

\*\*1982-1990 are projections based on Montana Power Company forecasts and the U. S. Department of Energy forecasts.  
 1982-1990 costs reflect the assumption that all levels of consumption will be the same as in 1981.

**BUTTE-SILVER BOW GOVERNMENT  
ANNUAL ENERGY EXPENDITURES**

ELECTRICITY, NATURAL GAS, GASOLINE, DIESEL, PROPANE  
Includes STREET LIGHTING



**BUTTE-SILVER BOW GOVERNMENT  
PROJECTED ENERGY COSTS****1981 vs 1990**

## ENERGY CONSUMPTION &amp; PROJECTIONS FOR FISCAL YEAR 1982-83

BUILDING	FISCAL YEAR	KW ELECTRICAL CONSUMPTION	\$ COST	MCF NATURAL GAS CONSUMPTION	\$ COST	TOTAL \$ COST
Courthouse	81-82	321,436	\$ 9,291.44	11,423	\$49,936.61	\$59,228.05
% Change	82-83	315,007 -2%	10,471.45 +12%	10,852 -5%	53,131.68 +6.4%	63,603.13 +7.4%
Civic Center	81-82	586,240	15,417.16	10,201	44,599.75	60,016.91
% Change	82-83	574,515 -2%	16,922.00 +10%	9,691 -5%	47,455.00 +6.4%	64,377.00 +7.3%
Community Center	81-82	120,720	<del>---</del> 4,207.00	2,966.1	12,907.73	17,114.73
% Change	82-83	111,000 -1%	4,838.00 +15%	2,875 -3%	14,022.40 +9%	18,860.40 +10.2%
Airport (Terminal & Garage)	81-82	371,910	10,163.00	5,654.9	24,497.78	34,660.78
% Change	82-83	371,910 -0%	11,687.50 +15%	5,598.3 -1%	27,164.50 +11%	38,852.00 +12%
Library	81-82	68,532	2,864.45	1,252	5,425.81	8,290.26
% Change	82-83	67,161 -2%	3,294.00 +15%	1,190 -5%	5,772.58 +6%	9,066.58 +9.3%
Public Safety Building	81-82	245,280	6,718.93	2,128.3	9,226.29	15,945.22
% Change	82-83	240,374 -2%	7,726.75 +15%	2,022 -5%	9,816.80 +6%	17,543.55 +10%
Metro Sewer	81-82	4,767,200	77,311.00	1,649	7,139.55	84,450.55
% Change	82-83	4,671,856 -2%	86,588.00 +12%	1,616 -2%	7,853.50 +10%	94,441.50 +11.8%
Maintenance & Service Center	81-82	252,096	6,898.21	3,725.6	16,178.67	23,076.88
% Change	82-83	247,054 -2%	7,863.95 +14%	3,539.32 -5%	17,214.11 +6.4%	25,078.06 +8.7%
Stodden Park Pool	81-82	62,100	2,430.00	2,006	8,366.51	10,796.51
% Change	82-83	60,858 -2%	2,794.50 +15%	1,705 -15%	8,177.65 -2%	10,972.15 +1.6%

### PART III: PLOTTING A COURSE FOR ENERGY EFFICIENCY

Energy conservation is a very effective way of cutting energy costs. In Butte-Silver Bow, we have seen the fruits of the labors of energy conservation by examining the cut-backs in energy consumption in the various sectors. Individuals, businesses, industry, churches, schools, non-profit groups, and the local government have all cut back on energy waste and increased energy efficiency. The main impetus for conservation taking hold has been simple and logical economics. As the costs of energy rise, conservation becomes more and more attractive. Two years ago the expense putout for a particular energy conservation measure may have paid for itself in four or five years. Now the same energy conservation measure may pay for itself in two years due to recent increases in prices.

Conservation not only saves money, but it helps to promote a cleaner, healthier, and safer environment, and it is more reliable because one is not so dependent on large supplies of imported energy. Conservation is also a good idea because we are preserving valuable energy for future years. The cost of investing in conservation is easy to justify by looking at payback times and life-time savings. It is even more inviting when the costs of conservation are compared to the costs of new electrical generating plants.

One million BTU's saved through energy conservation is about one-sixth the cost of producing one million BTU's through a new electrical generating plant. This information is according to a Bonneville Power Administration study done by the consulting firm of Skidmore, Owings, and Merrill.

#### 30% Savings for Buildings & Vehicle Fleet

Butte-Silver Bow's government buildings are in need of thorough weatherization in the form of ceiling and wall insulation, window treatment, air infiltration prevention, pipe insulation, and general repair and maintenance work. In addition, all mechanical systems should be tuned up, improved and maintained for optimum efficiency. All heating and ventilating systems should not only be tuned up and upgraded as soon as possible, but then should be maintained to operate at their most efficient operating level; just as an automobile needs to be maintained and tuned up.

There is one other element that must be considered in the overall energy management plan, and that is the human factor. It is people who consume energy, and it is people who must be willing to conserve, to help out, and to do their own part. The energy problem is one that will be with us for a long time, and it is a problem that must be dealt with by many people in order to reach solutions.

A 30% savings in energy consumption is possible in government facilities by adopting an energy plan that takes into account the following three factors:



1. Human Element-People must be willing to cooperate and do their part to be a part of the solution. Energy Awareness seminars and workshops can be conducted, and information can be provided to all employees. Dept. heads must take the lead and demand conservation policies be upheld.
2. Weatherization-All buildings and facilities must be tightened up, insulated, and improved to reduce heat loss and increased overall energy efficiency.
3. Heating & Ventilating/Mechanical Systems-The heating and ventilating systems must be improved for optimum energy efficiency. The way some of them are working now is very inefficient and wasteful. The Courthouse boiler and heat distribution system is in need of major repairs. The Civic Center System needs some improvements on its heating distribution system, and every building could use some improvements.

All three of these elements are necessary to achieve the full benefits of an energy conservation program in Butte-Silver Bow. Each building and facility has been analyzed and overall about 30% energy savings could be realized with a complete conservation effort. In addition, 30% savings could be realized by increasing efficiency in the vehicle fleet.

The previous tables pointed out the large savings that are possible through a serious and dynamic energy conservation program. The investments made in conservation today will pay for themselves over and over again and actually will save large amounts of money for the local government. The 30% reduction in motor fuels could come from a combination of efforts: 1) A reduction in the number of vehicles from the present 100 to the number that is strictly essential for effective operations. Other ways to cut vehicle fuel consumption are presented under Recommendations.

Energy costs in the future will become a very critical matter for the Butte-Silver Bow government. Actions must be taken now to ward off the dangers of energy costs getting out of hand. There are a wide variety of solutions to implement in the various facilities. The following recommendations should be pursued and implemented as soon as possible.

#### General Recommendations

- Thermostats should be set at 65-68° during the heating season, set back to 50-55° at night, weekends, and other off hours.
- Air conditioning should be set at 78° in the cooling season and shut off at night, weekends, and other off hours.
- Ventilating systems should be shut off during off hours.
- Infrequently used rooms should be closed off and the heat turned down to 50-55° when not in use.

- Drapes, blinds, and shades should be utilized wherever possible by closing them at night and weekends during the winter and opening during the day.
- Heating should be turned back one-half to one hour before the end of the work day and turned up in the morning when necessary.
- Lighting should be turned off when not in use. It is cheaper to turn lights off even for a few minutes than to leave them on.
- Turn off all typewriters, radios, and other office machines when not in use, leaving for lunch, and anytime they will not be in use for more than a few minutes and certainly turn everything off at the end of the day.
- Use natural light, from windows, whenever possible.
- Incandescent lights should be replaced with florescent lighting wherever possible.
- Task lighting wherever possible is more efficient and provides better lighting than lighting up an entire room.
- Lighting levels in hallways and corridors should be reduced to a minimum safe level.
- Hot water heaters should be set at 105° wherever possible.
- Adopt a set of policies for the Public Works Department, Police Dept., Government Buildings, Fire Dept., Community Development Dept., Planning Dept., Airport, and all others that will support and encourage energy conservation and efficient operations in all areas of local government.

## Savings In Government Buildings

Implementation of energy management techniques and low-cost/no-cost energy conservation applications have saved the Butte-Silver Bow government significant amounts of money in the operation of government facilities.

Approximate savings have been realized on the following facilities from 1979 thru 1981:

<u>Building</u>	<u>% Savings</u>	<u>(for 2 years) Total \$ Savings</u>
Courthouse & Jail	14%	\$14,448.00
Civic Center	3%	3,236.00
Library	14.4%	2,024.00
Community Center	17%	4,725.00
Archives (change of operation)	64%	1,114.00
Stodden Park Pool	10.5%	2,480.00
Public Safety	1.5%	361.00
Fire Station #2	9.4%	916.00
TOTAL		<u>\$29,304.00</u>
Estimated 1982 Energy Savings for first 6 months of the year		<u>\$18,350.00</u>
Total Savings Since 1979 in Government Buildings		<u>\$47,654.00</u>
Additional savings have been made in vehicle fuel consumption of 4% from 1980-82 fiscal years		<u>\$ 7,728.50</u>
TOTAL SAVINGS		<u>\$55,382.50</u>

# SPECIFIC ENERGY CONSERVATION INVESTMENTS

*Costs and savings are calculated for 1982 estimated costs and 1982 energy prices.*

ENERGY EFFICIENCY MEASURE	CAPITAL COST & FINANCING PLAN	SAVINGS & (approx.)	RESPONSIBLE OFFICE	PAYBACK TIME
<u>Courthouse &amp; Jail</u>				
● Install forced draft burner (Marc II Commercial/Industrial or equivalent) on main gas steam boiler.  Reduce fire box size of old coal boiler for more efficient gas burning.  Replace controls and valves to accomodate new forced draft system and tune up complete system.	\$19,500  12 months @ \$1,752.10/month or 24 months @ \$1,011/month	20%	Government Buildings & Energy Office	2-2½ yr.
● Back all radiators with 1/8" foil-faced radiator reflectors to prevent heat loss to outside walls. (95 radiators--1,500 ft² of reflector.)	\$ 1,850 Payment upon completion/job	3-5%	Government Buildings & Energy Office	1-1½ yr.
● Caulk and seal all skylights. Seal off 4 tight well/skylights on roof, seal off large skylight in Clerk of the Court's upper deck, caulk outer main dome and 7 other skylights.	\$ 5,150 Payment upon completion/job	3% on energy + savings/bldg. maintenance		4 yr.
● Install storm front/vestibules on 2 main entrance doorways (not revolving doors). Bronze frames & tempered glass to be installed as air lock inside building.	\$ 3,650 Payment upon completion/job	2%+ increased comfort level for 1st floor offices	Government Buildings & Energy Office	3½-4 yr.
● Insulate all upper windows with Sentinel window insulation or equivalent--1,968 ft²; windows cleaned and caulked; window insulation placed in rooms with excessive glass--900 ft².	\$ 5,320 Payment upon completion/job	2½-3%+ increased comfort level	Government Buildings & Energy Office	4-5 yr.
● Weatherstrip doors, caulk windows, replace broken or cracked glass, repauty loose windows.	\$ 1,580 Upon completion	4% + increas. comfort level	Government Buildings & Energy Office	1 yr.
● Close off top of 2 main structural columns and seal tight to reduce heat loss.	\$ 200	1%	Government Bldg. & Ener. Off.	1 yr.

ENERGY EFFICIENCY MEASURE	CAPITAL COST		RESPONSIBLE OFFICE	PAYBACK TIME
	FINANCING PLAN	SAVINGS (approx.)		

### Courthouse & Jail (cont'd)

• Insulate all basement heating pipes.	\$ 900	1%	Government Buildings & Energy Office	2 yr.
• Install energy management control system with 50-55 day/night room thermostats and 150 new valves with complete pneumatic control system including compressor, 7-day clock, all pneumatic piping.	\$50-60 thousand 1-2 yr. payment plan. 1st yr.-1st & 2nd fl. completed; 2nd yr. 3rd & 4th fl. completed. (paymnt. every 6 mo.)	20-25%	Government Buildings & Energy Office	4 yr.
• Energy Management Service Contract	\$ 700/year	2% + better maintenance & control	Government Buildings & Energy Office	½ yr.
Note: See following list of Energy Conservation Measures				
Courthouse TOTAL \$88,150				

### Civic Center

• 8 new damper ventilating units installed to replace broken relief dampers on rooftop including all necessary controls. Ceiling fans adjusted to circulate inside air & reduce amount of outside air brought into building.	\$ 4,570 Payment plan available	10%	Government Buildings & Energy Office	1½ yr.
• Install 2 5000 watt fan forced wall-mounted heating units with thermostat in Civic Center Mgr. Office and Recreation Office. This will eliminate the need to bring heat all the way from main boiler in rear of building.	\$ 1,200 Upon completion	10%	Government Buildings	½-1 yr.
• Insulate all exposed heating pipes.	\$ 2,600	5%	Government Buildings	1-2 yr.
• Insulate windows & install inside storm windows including caulking on Mgr. Office & Recreation Offices.	\$ 1,450	1% + incr. conf. level	Government Buildings & Energy Office	4 yr.
Note: See following list				
Civic Center TOTAL \$9,820				

ENERGY EFFICIENCY MEASURE	CAPITAL COST & FINANCING PLAN		SAVINGS (approx.)	RESPONSIBLE OFFICE	PAYBACK TIME

### Library

● Insulate attic to R-38.	\$ 3,000	15%	Government Buildings & Energy Office	3½-4½ yr
● Install double entry doorway vestibule on main door.	1,250	7% + incr. conf't. level	Government Buildings	3-4 yr.
● Window treatment, combination of insulating shutters and shades on all windows, especially upper main floor.	5,500	18% + incr. conf't. level	Government Buildings & Energy Office	5-6 yr.
● Energy Management Service Contract.	500	2% + maintenance control	Government Buildings	1 yr.
Note: See following list				

Library TOTAL \$10,250

### Public Safety Building

● Correct existing heating system valve problem or go to a new temperature control system.	20,000	Uncertain	Government Buildings
--	--------	-----------	----------------------

Note: See following list

## ENERGY CONSERVATION MEASURES

### Courthouse & Jail

- Close the doors to the offices on first, second, and third floors in order to keep heat in rooms and prevent heat from escaping out into the rotunda.
- Utilize insulating blinds and curtains to insulate windows, especially on the north side.
- Replace remaining incandescent lights with fluorescent fixtures and turn off all unnecessary lighting in the halls and unoccupied areas.
- Disconnect ballasts where lamps have been removed and remove lamps where practical. Replace burned out lamps with more efficient types of lamps.
- Clean lights and fixtures on a regular basis.
- Install locking thermostat cover in the jail.
- Insulate the ceiling/roof of the jail.
- A system of testing and record keeping should be initiated immediately to insure proper and efficient boiler operation. Stack temperatures and flue gas analysis should be taken on a regular basis and adjustments made periodically for most efficient boiler operation.

### Civic Center

- Reduce thermostat settings when arena area is not in use and at night for entire building. Utilize separate unit space heaters in work/office areas.
- Turn down heat in all lobbies, hallways and restrooms to 55° maximum.
- Keep accurate records for all motors and motor driven equipment and insure proper maintenance procedures.
- Replace incandescent lamps with most energy efficient types such as fluorescent or high pressure sodium lamps.
- Clean all lamps and fixtures on a regular basis.
- Keep lights turned off in unoccupied areas. When cleaning or working in a specific area, attempt to light only that area instead of entire building.
- Install caulking and weatherstripping on all windows and doors.
- Insulate the roof.
- Boiler should be tested regularly for proper flue gas analysis and stack temperature. The system should be maintained to operate at most efficient level.

## ENERGY CONSERVATION MEASURES

(cont'd)

### Library

- Clean lights and lighting fixtures regularly.
- Test furnace efficiency periodically and maintain most efficient operation of heating system.
- Install locking thermostat covers on thermostats.
- Change to more efficient 35-watt fluorescent tubes instead of 40-watt. Replace burned out ballasts with more efficient energy conserving ballasts.
- Use quality weatherstripping and caulking on windows and doors.

### Public Safety Building

- Install solar hot water system to meet hot water needs of the building.
- Install locking thermostat covers on thermostats.
- Change to more efficient 35-watt fluorescent tubes instead of 40-watt. Replace burned out ballasts with more efficient energy conserving ballasts.
- Maintain hot water temperature at 140° and no hotter.
- Fire engine doors should be kept closed whenever possible during heating season.

### Community Center

- Install window insulation.
- Install air conditioning unit in kitchen area and proper ventilation.

### Maintenance & Service Center

- Overhead doors should be kept closed whenever possible during heating season.
- Install more efficient lighting such as high pressure sodium lamps.
- Install air circulation devices to circulate warm air from the top of the room to the bottom.

### South Side Fire Station

- Install solar hot water system.
- Install locking thermostat covers on thermostats.



## ENERGY CONSERVATION MEASURES

(cont'd)

### South Side Fire Station (cont'd)

- Install more efficient fluorescent tubes and ballasts in all lighting fixtures.
- Keep lights off in unoccupied areas and when not necessary.
- Remove two lamps and disconnect ballasts from four lamp fixtures.
- Add roof insulation to increase building efficiency.
- Energy efficiency analysis on all Butte-Silver Bow Government facilities should continue. Special attention must be given to the Metro Sewer Treatment Plant, the new Asphalt Recycling Plant, the Airport Terminal, Stodden Park complex, the 8 Volunteer Fire Stations, and all other buildings and operations.

## ADDITIONAL ENERGY CONSERVATION MEASURES

- Heat Reclaimer-Thermostat system and other heat recovery devices to be analyzed for all boilers to increase energy efficiency.
- Moto Mizer units and other energy efficiency units to be analyzed for electric motors, especially for metro sewer treatment plant.
- Complete Energy Management Computer system to be investigated for controlling all energy consumption in all buildings and facilities. Cost estimate--\$250,000. This could be justified as energy prices escalate. The state capitol and Missoula County have installed similar systems. A possible cost sharing program with Butte School Distric No. 1 will be pursued.
- Butte-Silver Bow Transit system should be promoted. As gasoline prices increase, the bus system will provide a valuable service to the citizens of Butte-Silver Bow.
- The new Asphalt Recycling Plant will save energy and money in the form of old oil being reused as new pavement.
- A solar hot water heating system should be considered for the Stodden Park Pool. Cost estimate--\$25,000 (to supply all hot water needs).
- The Metro Sewer Treatment Plant has initiated an energy efficiency program and all efforts should be made to continue efficiency efforts at the plant.
- A waste to energy plant will be investigated as many communities burn their garbage in modern incinerators to produce heat and electricity.

## ADDITIONAL ENERGY CONSERVATION MEASURES (cont'd)

- Removal of 4-way stop streets is a good example of increasing energy efficiency for the community and increasing traffic flow efficiency. (Removal of nine 4-way stops saved residents approximately 45,569 gal./gas for an annual savings of \$56,836.)
- All volunteer fire stations should receive energy audits and recommendations.
- Solar energy heating will be analyzed for all government buildings.

### Street Lighting-Public Works Dept.

- Montana Power has proposed large increases in street lighting rates. Street lighting should be made more energy efficient by the installation of high-pressure sodium lighting. All new lighting districts should be high-pressure sodium only which are four times as efficient as incandescent lights. A working relationship with Montana Power, the State Energy Office, the Montana Consumer Council, and many cities and towns has been organized to come up with a plan to provide the most efficient street lighting at the least possible cost.

### Vehicle Fleet-Public Works Dept.

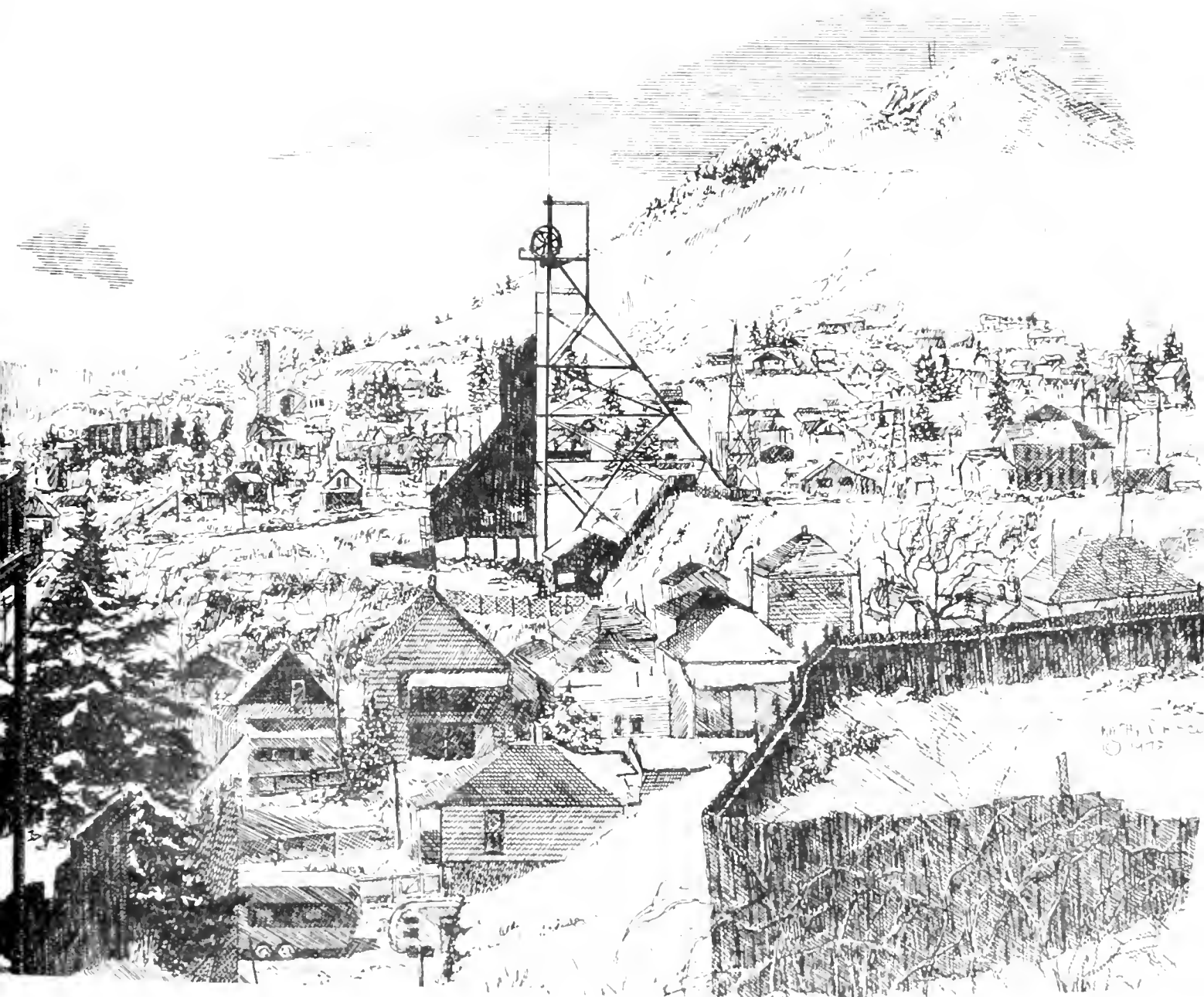
- The conversion of vehicles to propane and to compressed natural gas (CNG) fuel has been investigated. The CNG and propane options look very good for Butte-Silver Bow's fleet. The Montana Power Company is presently converting many vehicles to CNG and they are eager to sign on new customers and to stand behind the conversion process.

The conversion of 20 vehicles to CNG and the refueling station would be \$73,831 and would cut fuel costs by 50% or a savings of over \$26,000 the first year. The system would pay for itself in less than three years, and innovative financing is available.

- Police vehicles should be adopting a policy of parking vehicles in designated areas for a certain amount of time each hour (15-25 min.) or whatever could be safely justified.
- All vehicles should be maintained properly for most efficient operation and big gas guzzlers should be weeded out for more efficient running vehicles.
- All engines should be turned off in vehicles when not necessary.
- Traffic control could be made more efficient by switching to red or yellow blinking lights late at night and wherever safe.

## POLICIES & PROCEDURES FOR ENERGY EFFICIENCY

- Planning Department should adopt energy efficiency considerations for buildings, zoning, solar access and overall planning procedures.
- Community Development Dept. should continue to promote more energy efficiency in housing rehabilitation and community development projects.
- The Energy Office should continue to develop more energy conservation practices for the Butte-Silver Bow Government and for the entire community.
- Activities of the Bonneville Power Administration and the Montana Power Company will be monitored for cooperative efforts as we work together for a stable energy future.



#### PART IV: ACTIVITIES ACCOMPLISHED BY THE BUTTE-SILVER BOW ENERGY OFFICE

Many activities have been accomplished since the energy program started vigorously in the spring of 1980. The following listing is a partial description of major activities over the past two years.

##### Education/Public Information

1. The establishment of the Community Energy Management Program Advisory Committee brought people together from various backgrounds and beliefs to discuss our energy futures.
2. Close contact was made with many state agencies and other local energy management programs from across Montana and across the country.
3. An energy merchants directory was put together to inform people about local dealers in energy saving products. The directory also helped to promote local businesses and many discounts have been offered to the public.
4. Assistance has been given to many organizations and individuals--locally, around Montana, and throughout the U.S. on various energy matters.
5. The Butte-Silver Bow Energy program has been featured in several national publications and national conferences because of its well-rounded and thorough program.
6. A technical advisory committee has been organized for support on energy projects.
7. A public information office was established in the Courthouse with free literature and assistance.
8. The Butte Public Library set up an energy information center with free literature, many new energy books, and many energy films available to the public.
9. Many energy programs have been conducted throughout Butte's schools and have been successful.
10. Community seminars and workshops have been conducted on a wide variety of energy topics to help people cope with their energy problems.
11. Door-to-door energy information campaigns were conducted and reached about 10,500 households in Butte-Silver Bow.
12. Energy surveys were conducted to test people's attitudes toward energy problems and to spread energy conservation ideas.

14. Energy Awareness Week, Get Ready for Winter Campaign, Sun Day, and other special events were organized to raise the level of awareness of the people about energy matters.
15. There has been a great deal of participation in state, local and national meetings, conferences and idea exchanges by Butte's Energy Program representatives.
16. Presentations have been given to many community groups concerning energy problems in Butte-Silver Bow and energy conservation solutions. This has been a valuable public service and is on-going.
17. Brochures, handout materials, and several copies of a newsletter--"The Baseline"--were developed and distributed to the public.
18. A large quantity of free literature has been distributed throughout Butte-Silver Bow. Free materials (books, pamphlets, posters, brochures, papers) were supplied by Montana Power, NCAT, D.O.E., the State Energy Office, and others.
19. A cooperative effort with the National Center for Appropriate Technology for training people in community energy management techniques was conducted.
20. Several energy slide shows have been developed on conservation and particularly on Butte-Silver Bow and energy programs in Montana.

#### Technical Assistance Research

1. Data collection and assimilation for all of the six sectors (residential, commercial, industrial, institutions and non-profit organizations, transportation, and local government) has been conducted.
2. Energy audits were accomplished on all major Butte-Silver Bow facilities.
3. Energy audits were conducted on all Butte schools. This effort was coordinated by the Butte Energy Program.
4. Low-cost and no-cost energy conservation measures were implemented in many government buildings.
5. Energy audits were accomplished on many churches, several businesses, the YMCA, NCAT, and other non-profit groups' facilities.
6. Assistance is offered to individuals and groups who are seeking help with energy problems.
7. Data collection through the use of Montana Power Company's computer was secured to provide energy data on specific buildings and accounts.

8. Energy-saving recommendations were developed for the commercial and residential sectors.
9. A wide variety of energy conservation measures have been implemented at the Courthouse, Library, Civic Center, Metro Sewer, Public Safety, and Community Center. Energy conservation measures such as rescheduling janitorial services to close buildings down at night and educating employees to turn out lights and machines when not in use cost nothing to implement, but can actually save large amounts of energy. Other energy conservation measures like insulating the hot water tanks at the Civic Center, Stodden Park Pool and Mercury St. Fire Station, installing a vestibule doorway on the Public Safety Building, insulating some windows at the Courthouse, installing inside storm windows and boiler tune-up work all cost money, but save significant amounts of energy.
10. Investigation into the potential for renewable energy development in the Butte area has been pursued, showing that weatherization and energy conservation is the top priority. Solar energy potential is significant and should be promoted and utilized for water heating and space heating. Wood heat is a growing energy source and should be promoted in a safe and healthy manner. Small scale hydro-electric generation has limited potential as does wind power in certain parts of Silver Bow County.
11. A study has been conducted on overall energy consumption patterns for all sectors of Butte-Silver Bow. This study includes an analysis of the socioeconomic conditions in Butte-Silver Bow, an analysis of labor force and market conditions and forecasts of future energy demands and costs in this area.
12. The Butte Energy Office has been assisting the Community Development Dept. on the solar systems that are part of the HUD rehabilitation project in the central Butte neighborhood. The specifications for solar hot water and hot air systems were drawn up and bid requests let out. The review process of 13 different solar systems was conducted and the first three solar hot water systems were awarded to Conservation Technology of Billings with their Hyperion system.
13. A preliminary Energy Emergency Contingency Plan was developed to go along with the state guidelines.
14. Energy consumption data is recorded onto the computer in the budget office every month. The energy office reviews the monthly totals and keeps track of energy expenditures.
15. An extensive search for an insulating pool blanket led to the purchase of an Alta Products isomere foam which should cut heating costs at the Municipal Pool by 50%.

16. Investigation into alternative fuels for the vehicle fleet shows advantages of propane and compressed natural gas, especially in relation to rising gasoline prices.
17. Heating systems analysis at the Courthouse, Library, Civic Center, Public Safety Center, Airport, and Community Center were conducted with specific recommendations made.
18. Estimates on many energy-saving measures have been secured for various buildings with cost-effective calculations figured in.
19. Testimony was given to the Montana Public Service Commission on proposed electricity and natural gas increases at public hearings in Helena.
20. A special analysis of street lighting costs and energy-efficiency changes was conducted by energy coordinators from around the state at meetings in Helena, Bozeman, and Butte, and efforts will be made to continue pushing for street lighting efficiency.
21. The promotion of energy conservation, recycling, local renewable energy development, and overall energy awareness has been emphasized throughout the course of the energy program.

#### Financial

1. An energy grant for \$20,000 was awarded to Butte-Silver Bow by the State Energy Office for 1981 (calendar year).
2. A supplemental grant for \$10,000 was awarded for the first six months of 1982, making the total from the State Energy Office \$30,000.
3. Various financing mechanisms have been investigated and researched for their applicability to projects in Butte-Silver Bow and to various communities around the state.
4. Participation in the Institutional Building Grants Program brought in \$950 to help defray the costs of energy audits on government buildings.
5. Energy audits conducted on all Butte Schools brought \$2800 into the Butte-Silver Bow Energy Office.
6. Financial support and in-kind support from the Montana Power Co., NCAT, the Human Resource Council, and the North American Indian Alliance, along with various departments of the Butte-Silver Bow Government, have all combined to further the efforts of the energy program.
7. Efforts are being made to identify all funding possibilities for different aspects of Butte-Silver Bow's energy activities for individuals, businesses, schools, non-profit organizations, and the local government.

## APPENDIX A

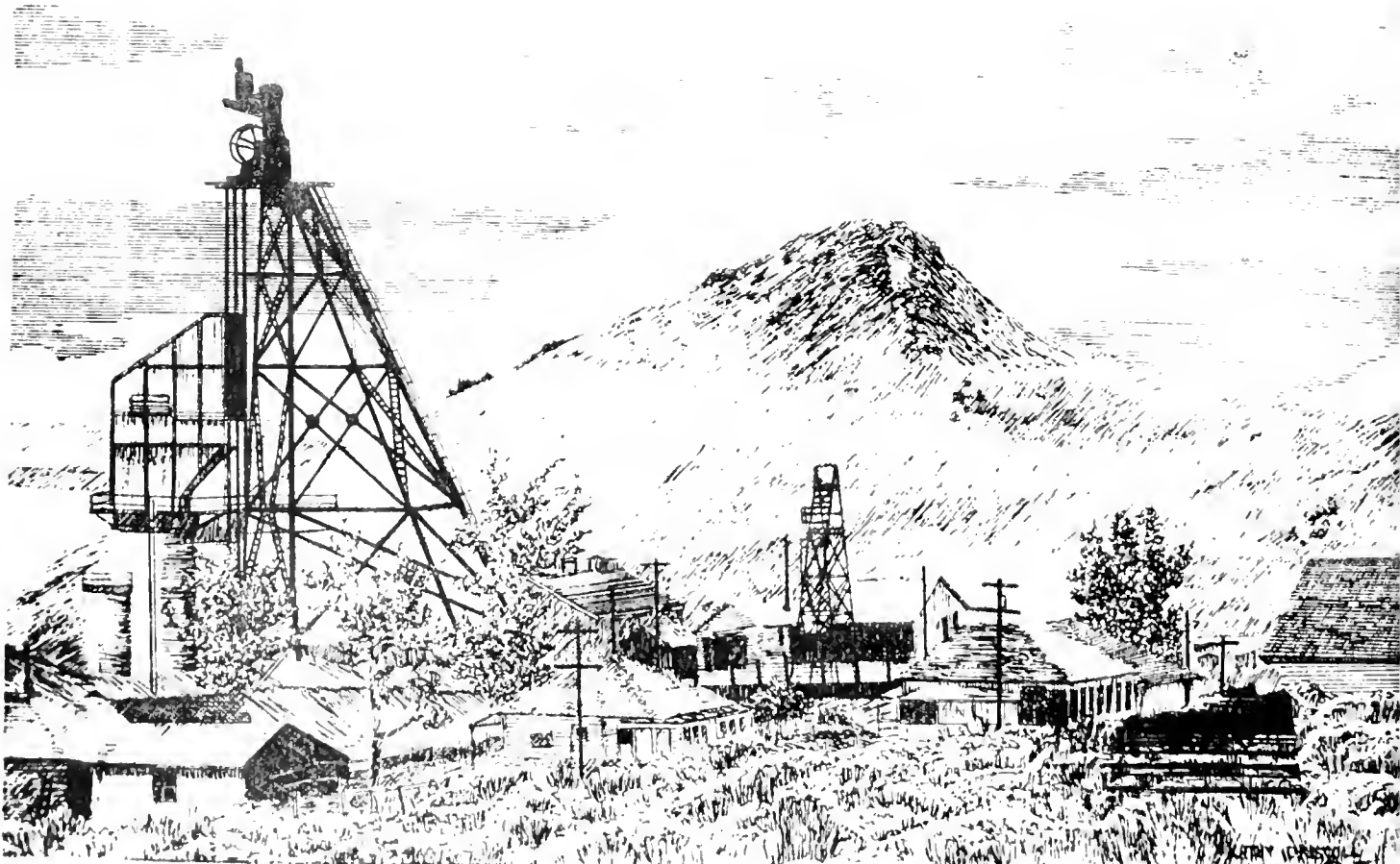
### BUTTE-SILVER BOW GOVERNMENT STRUCTURE

The Butte-Silver Bow Government was formed by consolidation in May 1977 when the city of Butte and Silver Bow County governments combined to create a more efficient local governing body. The total number of Butte-Silver Bow employees, with a breakdown for full-time, part-time and temporary, is presented in Appendix A-1 for the years 1977-1982, calculated for May of each year.

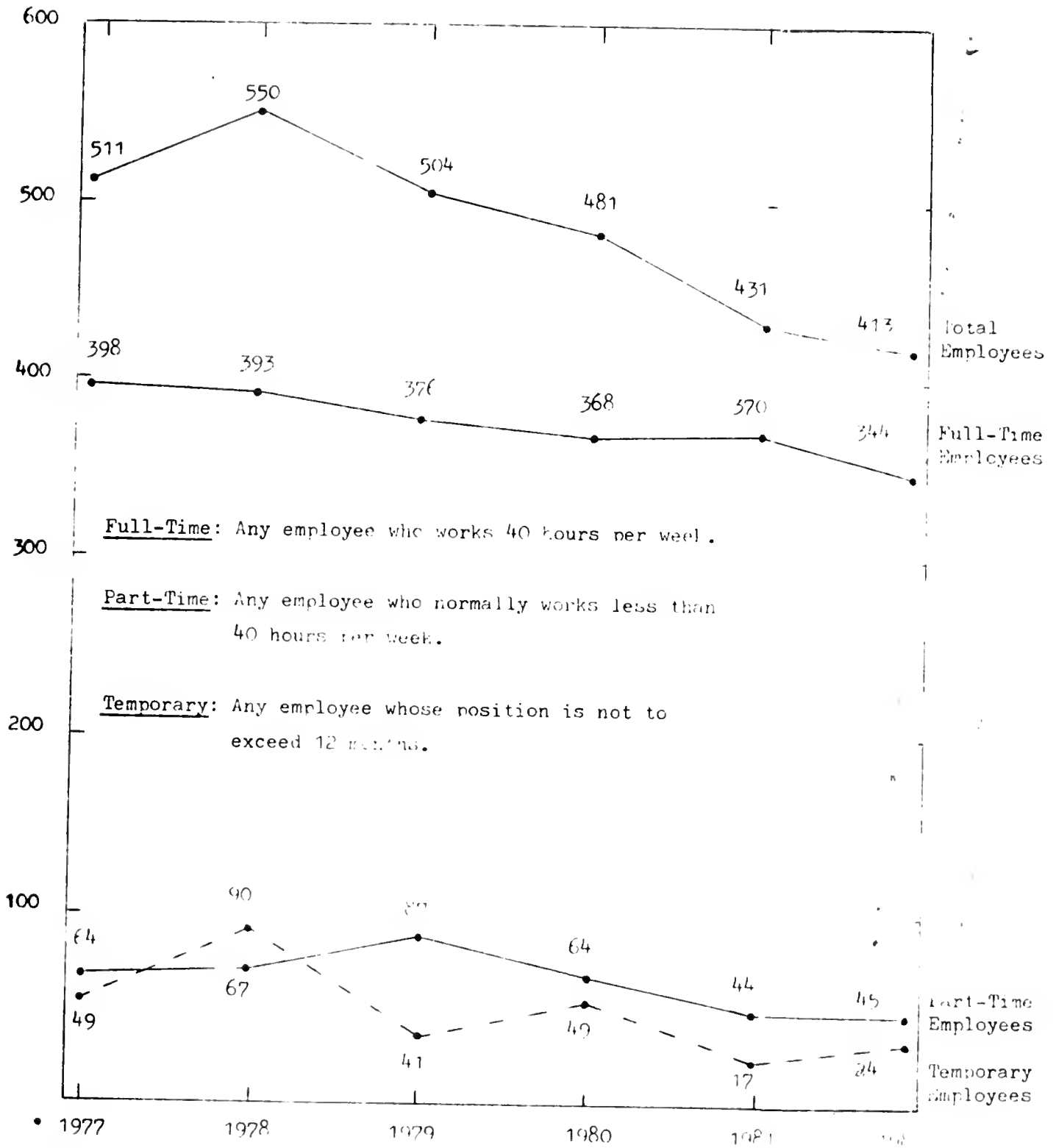
The Butte-Silver Bow operating budget has fluctuated very little over the past five years, as can be seen from the following figures:

#### Fiscal Year

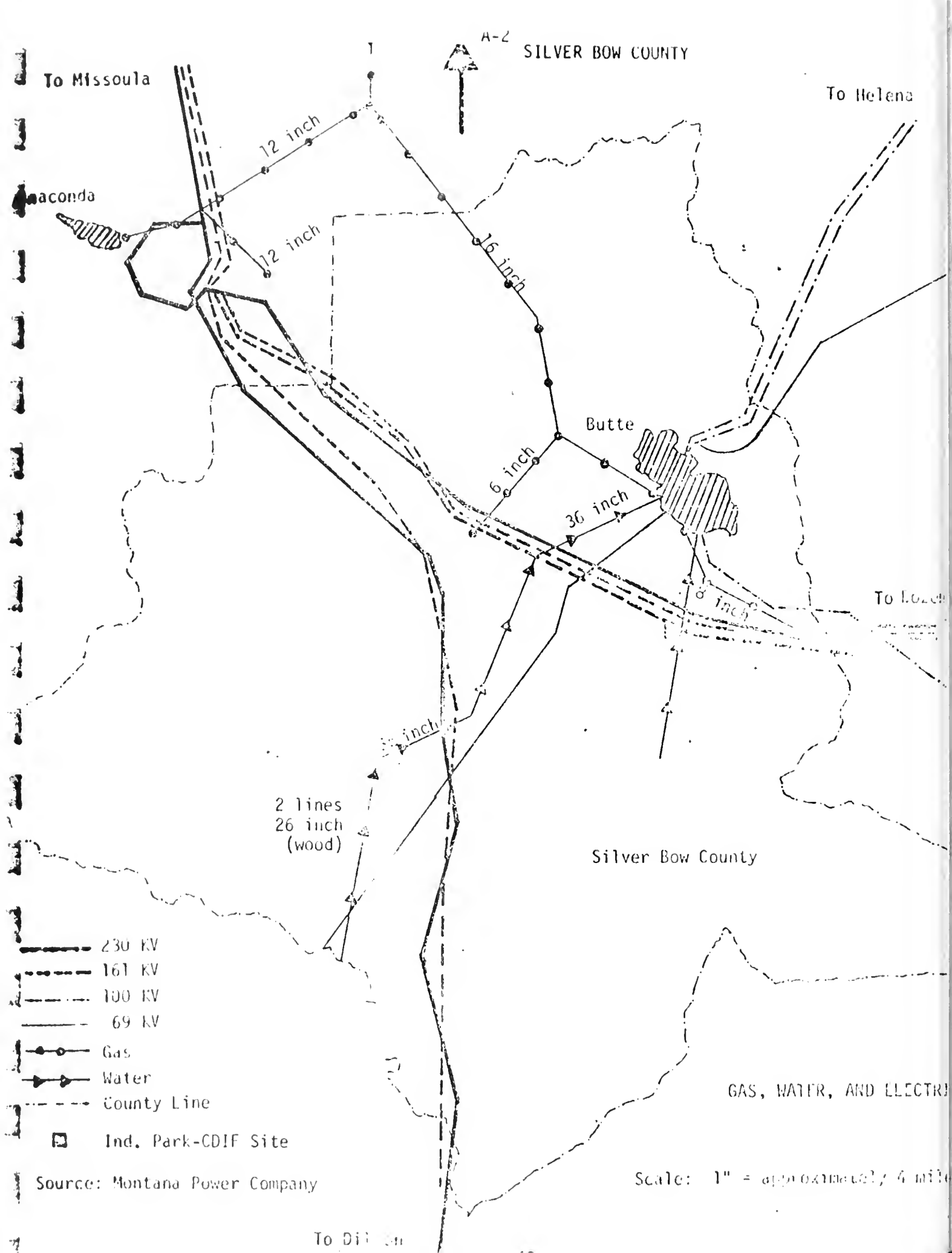
1977-78	: \$14,201,173.14
1978-79	: \$16,688,979.93
1979-80	: \$15,870,621.53
1980-81	: \$15,458,471.43
1981-82	: \$14,849,620.00





BUTTE - SILVER BOW EMPLOYEES

\* Employee figures are calculated for May of each year.



1 RESOLUTION NO. \_\_\_\_\_

2 A RESOLUTION ESTABLISHING AND APPROVING A COMPREHENSIVE ENERGY POLICY  
3 FOR THE COMMUNITIES OF BUTTE-SILVER BOW.

4 WHEREAS, energy is an integral part of society; and

5 WHEREAS, energy costs to all sectors (Residential, Commercial, Indus-  
6 trial, Transportation, Government, Institutions and Non-Profit  
7 Organizations) continue to rise at an unprecedented rate and  
8 are expected to increase even more dramatically in the future;  
9 and

10 WHEREAS, existing fossil fuel reserves are limited and being depleted  
11 faster than new sources of energy are being developed; and

12 WHEREAS, it being a proven, sound economical, ecological and socio-  
13 logical practice to incorporate energy conservation measures  
14 and to utilize sustainable energy sources wherever possible; and

15 WHEREAS, it being in the best interest of the citizens of Butte-Silver  
16 Bow.

17 NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF COMMISSIONERS OF THE  
18 CITY AND COUNTY OF BUTTE-SILVER BOW, STATE OF MONTANA.

19 SECTION 1: That the policy of Butte-Silver Bow shall be to exemplify  
20 and foster wise energy use, particularly conservation  
21 measures, and the utilization of sustainable energy sources.

22 SECTION 2: That the Chief Executive is hereby empowered and authorized  
23 to execute and implement this policy in accordance with the  
24 laws of the State of Montana.

25 SECTION 3: This Resolution shall be in full force and effect from and  
26 after its passage and approval.

## APPENDIX B

### HEATING DEGREE DAYS

The term "Degree Days" is used to describe the average heating or cooling requirements of a certain area. A heating degree day accrues for every degree that the average outside temperature is below 65°F for a 24-hour period. For example, if the outside average air temperature is 30°F for a 24-hour period, then 35 degree days accrue because that is 35° less than 65°. It is assumed that if the outside temperature is 65°F or higher, then there is no heating requirements to keep the inside temperature at a comfortable level.

It is important to realize that the heating requirements in Butte-Silver Bow are among the highest in the continental United States. As can be seen from the following chart, Butte has the highest number of heating degree days of the 10 largest cities in Montana. The severe weather conditions are an integral part of the lifestyle and energy problems that are experienced in the Butte area. The higher the heating degree days outside, the more heat that is required to maintain a comfortable temperature on the inside.

B-1

#### Heating Degree Days 30 Year Average

Anaconda	8414
Billings	7265
Bozeman	8165
Butte	<u>9719</u>
Great Falls	7652
Havre	9109
Helena	8190
Missoula	7931
Miles City	7889
Kalispell	8554

HEATING DEGREE DAYS  
(Continued)

A closer look at monthly average heating degree days shows the months that are the most serious for heating purposes. Again, the higher the heating degree day number, the colder it is and the more heat that is required to maintain a 65°-70°F inside temperature.

B-2

Heating Degree Days in Butte  
Monthly Averages 1978-1981

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1978													
Monthly	1366	1187	983	734	620	255	90	190	389	714	1377	1824	9699
1979													
Monthly	2063	1269	1099	812	498	258	87	147	300	711	1323	1129	9746
1980													
Monthly	1728	1226	1208	682	494	303	83	203	339	731	1061	1042	9100
1981													
Monthly	1171	1093	926	687	516	276	70	29	300	723	1020	1372	8183

Climatological Data taken from the FAA station at the Butte Airport  
Elevation - 5540 feet above sea level  
Latitude - 45 -57  
Longitude - 112 -30

Heating Degree Days 9719 (30 year average)  
Cooling Degree Days 58 (30 year average)

NOAA National Oceanic and Atmospheric Administration, National Climatic Center, Climatological Data, Monthly Reports for Montana, 1978, 79, 80, 81, Asheville, N.C.

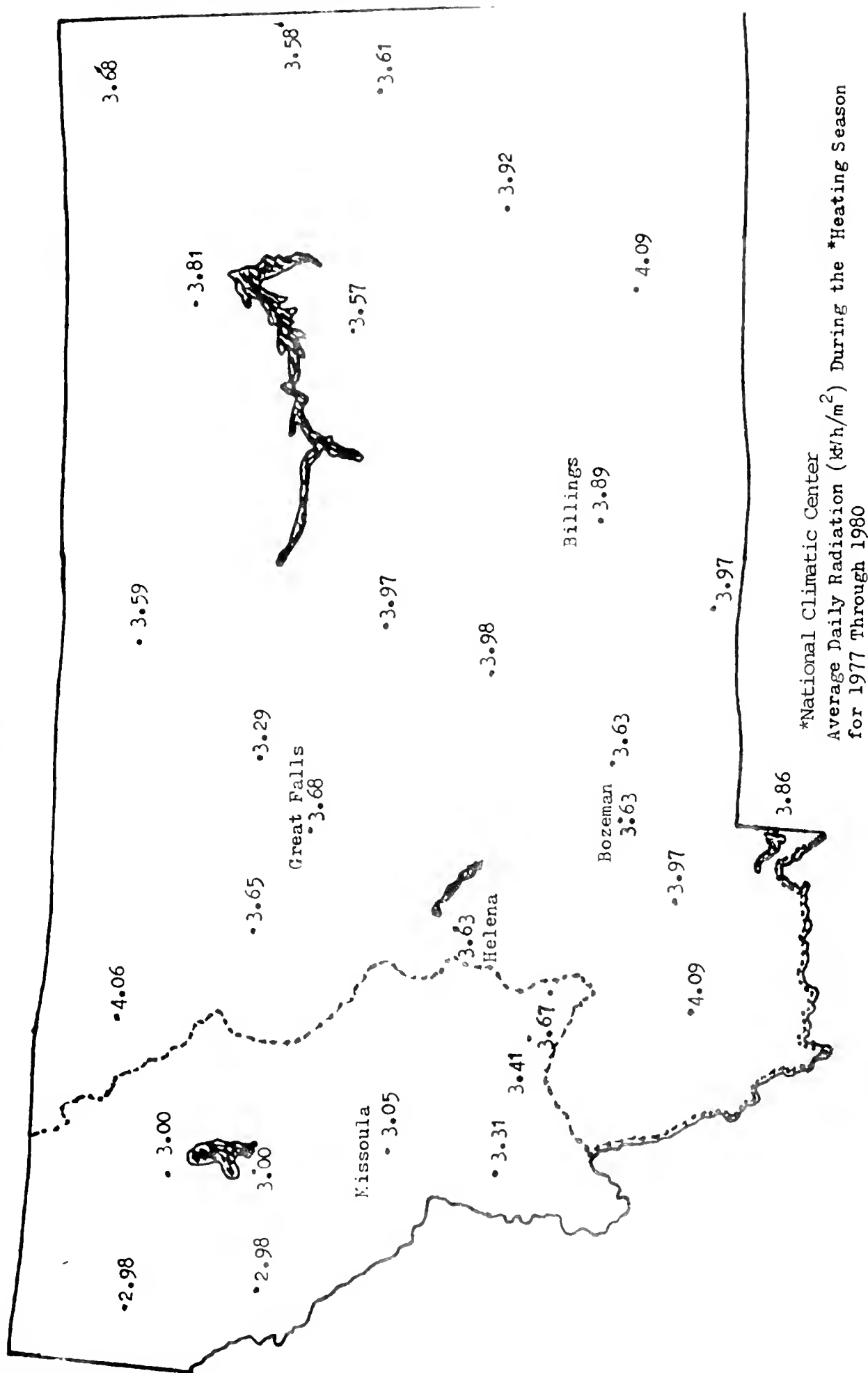
# APPENDIX C

## BUTTE-SILVER BOW COMMUNITY ENERGY MANAGEMENT PROGRAM

### ADVISORY COMMITTEE Butte, Montana 59701

Don Peoples	723-8262	Jack O'Brien	782-7200
Chief Executive	Ext. 201	Human Resource Council	
Butte-Silver Bow		District No. 12	
Courthouse, 155 West Granite		1100 Delaware Ave.	
Ric LeCoure, Manager		John Calcaterra	723-4311
Butte Civic Center	723-8262	Anaconda Copper Co.	
	Ext. 347	ARCO	
Joe Sedlak	494-4577	16 W. Granite	
NCAT		Frances Wendtland	723-8262
P.O. Box 3838		Butte-Silver Bow	Ext. 375
John McBride	494-4577	Public Library	
NCAT		West Broadway	
P.O. Box 3838		Allan Miller	494-6283
Richard Alexander	496-4101	Multi-Tech, Inc.	
Montana Tech		P. O. Box 4078	
John Orth	782-0463	Vincent McGee	723-4361
MERDI		North American Indian Alliance	
P. O. Box 3809		12 East Galena St.	
Peter Antonioli	723-5421	<u>TECHNICAL ADVISORY COMMITTEE</u>	
Montana Power Co.		John McBride	494-4577
40 East Broadway		NCAT	
Dan Regan	723-5421	P. O. Box 3838	
Montana Power Co.		*Renewable Energy Systems	
40 East Broadway		Bob Corbett	494-4577
Janet Cornish	723-8262	3601 South Montana St.	
Director	Ext. 354	*Building Technology/Renewables	
Butte-Silver Bow Urban		Toby Benson	494-4577
Revitalization Agency		3115 St. Ann St.	
Courthouse, 155 W. Granite		*Conservation/Weatherization	
John Astle	723-5870	Fred Quivik	
Butte High School		210 North Clark	
401 South Wyoming		*Building Technology/Renovation	
Blaine Cummins	723-5421	<hr/>	
Montana Power Company		<u>MEDIA</u>	
40 East Broadway		Sheri Meats	
Vincent Micone	723-6042	Montana Standard	
814 West Mercury		25 West Granite	
Corrine Shea	782-7200	Pat Kearney	
Human Resource Council		KXLF-TV	
District No. 12		1003 South Montana St.	
1100 Delaware Ave.			

# APPENDIX D SOLAR RADIATION MAP OF MONTANA



\*National Climatic Center  
Average Daily Radiation ( $kWh/m^2$ ) During the \*Heating Season  
for 1977 Through 1980

\*Heating Season = October 1 through April 30

## APPENDIX E

ENERGY CONSUMPTION DATA

## CIVIC CENTER

19 <u>78</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	12,000	\$ 444.75	1,958.	\$ 3,613.91	\$ 4,058.66
Feb.	19,680	539.66	1,724.	3,301.57	3,741.23
Mar	56,160	1,232.51	2,139.	3,932.85	5,165.36
Apr	59,040	1,274.06	1,241.	2,350.48	3,624.54
May	39,840	789.82	1,255.	2,375.15	3,164.97
June	48,960	1,119.93	752	1,472.10	2,592.03
July	66,720	1,392.01	46	110.32	1,502.33
Aug.	66,720	1,392.01	33	79.86	1,471.87
Sept	66,720	1,392.01	93	220.43	1,612.44
Oct.	72,480	1,500.06	590	1,150.23	2,650.09
Nov.	42,240	866.07	969	1,904.46	2,770.53
Dec.	38,400	809.80	2,484	4,664.87	5,474.67
Total	588,960	12,752.69	13,284	25,076.03	37,828.72

## CIVIC CENTER

19 <u>79</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	37,120	\$ 826.22	2,231	\$ 4,204.20	\$ 5,030.42
Feb.	50,560	1,015.27	1,985	3,756.26	4,771.53
Mar	94,080	1,761.57	1,836	3,484.95	5,246.52
Apr	123,520	2,046.91	1,781	3,384.81	5,431.72
May	42,240	896.39	591	1,194.10	2,090.49
June	29,120	712.94	204	450.25	1,163.19
July	30,720	711.83	136	310.71	1,022.54
Aug.	82,240	1,574.37	103	278.44	1,852.81
Sept	26,880	643.43	102	276.06	919.49
Oct.	44,480	1,082.35	109	320.86	1,403.21
Nov.	70,400	1,442.44	1,207	3,042.19	4,484.63
Dec.	71,360	1,443.47	1,879	5,122.57	6,566.04
Total	702,720	14,157.19	12,164	25,825.40	39,982.59



# ENERGY CONSUMPTION DATA

## CIVIC CENTER

19 <u>80</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	73,920	\$ 1,485.82	1,972	\$ 5,368.78	\$ 6,854.60
Feb.	53,120	1,066.84	2,010	6,117.06	7,183.90
Mar	81,920	1,593.00	1,372	4,171.80	5,764.80
Apr	130,560	2,072.59	1,805	6,210.71	8,283.30
May	9,920	572.46	547	1,873.13	2,445.59
June	31,360	704.86	392	1,351.62	2,056.48
July	31,680	697.08	153	527.54	1,224.62
Aug.	69,120	1,436.03	92	317.22	1,753.25
Sept	38,400	977.44	145	499.96	1,477.40
Oct.	60,800	1,325.06	389	1,341.27	2,666.33
Nov.	69,440	1,467.26	1,002	3,454.90	4,922.16
Dec.	72,640	1,511.34	1,744	6,013.31	7,524.65
Total	722,880	14,909.78	11,623	37,247.30	52,157.08

## CIVIC CENTER

19 <u>81</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	42,240	\$ 1,071.16	1,484	6,021.66	7,092.82
Feb.	61,440	1,617.52	1,100	4,459.55	6,077.07
Mar	95,040	2,153.63	1,148	4,654.81	6,808.44
Apr	45,760	1,383.92	776	3,196.34	4,580.26
May	26,560	763.63	408	1,680.55	2,444.18
June	17,280	584.86	213	877.35	1,462.21
July	60,160	1,555.97	67	275.97	1,831.94
Aug.	36,800	1,187.62	78	321.28	1,508.90
Sept	51,200	1,401.43	390	1,711.32	3,112.75
Oct.	56,320	1,494.05	552	2,422.18	3,916.23
Nov.	72,000	1,705.65	1,297	5,691.24	7,396.89
Dec.	79,040	1,838.53	1,747	7,649.35	9,487.88
Total	643,840	16,757.97	9,260	38,961.60	55,719.57

# ENERGY CONSUMPTION DATA

## Courthouse and Jail

19 <del>78</del>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	23,801	597.40	2069	3809.50	4406.90
Feb.	24,162	596.45	1892	3497.61	4094.06
Mar	22,735	594.46	1955	3608.62	4203.08
Apr	22,358	570.44	1468	2750.48	3320.92
May	23,796	591.77	1385	2604.22	3195.99
June	25,057	607.07	1215	2304.67	2911.74
July	23,430	596.02	468	962.96	1558.98
Aug.	24,162	628.34	144	327.12	955.46
Sept	24,693	623.15	167	374.32	997.47
Oct.	23,250	606.89	1249	2416.11	3023.00
Nov.	26,499	643.27	1404	2698.34	3341.61
Dec.	29,563	693.90	2341	4404.49	5098.39
Total	293,506	7,349.16	15,757	29,758.44	37,107.60

## Courthouse and Jail

19 <del>79</del>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	27221	661.73	2321	4368.07	5029.80
Feb.	28,843	688.89	2167	4087.66	4776.55
Mar	27,774	669.79	1665	3173.39	3843.38
Apr	29,390	696.66	1479	2834.91	3531.57
May	28,485	684.06	1244	2407.00	3091.06
June	29,935	699.46	964	1895.06	2594.52
July	27,948	671.96	480	985.51	1657.47
Aug.	30,644	705.11	165	425.96	1131.07
Sept	27,216	657.83	120	318.89	976.72
Oct.	28,119	678.82	392	1051.19	1730.01
Nov.	30,649	717.50	1193	3008.62	3726.12
Dec.	32,078	746.38	1686	4611.60	5357.98
Total	348,302	8,278.19	13,876	29,168.06	37,446.25

# ENERGY CONSUMPTION DATA

## Courthouse and Jail

19_80	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	33,893	766.97	1782	4865.76	5632.73
Feb.	32,995	758.69	1996	6074.37	6833.06
Mar	31,371	736.17	1521	4626.10	5362.27
Apr	33,536	761.30	1462	5028.05	5789.35
May	31,722	732.12	824	2828.22	3560.34
June	31,185	724.84	845	2913.56	3638.40
July	27,434	674.25	412	1420.58	2094.83
Aug.	26,099	662.91	126	434.45	1097.36
Sept	26,523	667.05	160	551.68	1218.73
Oct.	24,588	627.74	754	2599.79	3227.53
Nov.	24,529	633.28	1065	3672.12	4305.40
Dec.	26,156	647.44	1580	5447.84	6095.28
Total	350,031	8392.76	12,527	40,462.52	48,855.28

## Courthouse and Jail

19_81	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	25,427	761.64	1355	5496.89	6258.53
Feb.	27,590	797.20	1343	5448.07	6245.27
Mar	25,973	770.85	1126	4565.31	5336.16
Apr	26,333	776.75	926	3814.19	4590.94
May	25,804	768.58	740	3048.06	3816.64
June	24,420	748.26	331	1363.39	2111.65
July	26,163	776.91	63	259.50	1036.41
Aug.	23,970	663.97	58	238.90	902.87
Sept	24,696	740.87	561	2461.67	3202.54
Oct.	28,547	799.13	1238	5432.34	6231.47
Nov.	25,199	751.96	1295	5682.46	6434.42
Dec.	27,768	800.87	1685	7377.30	8178.17
Total	309,890	9156.99	10,721	45,188.08	54,345.07

# ENERGY CONSUMPTION DATA

## Metro Sewer Treatment Plant

19 <u>78</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	140,960	1,911.21	251	545.75	2456.96
Feb.	130,560	1,775.61	209	460.53	2236.14
Mar	146,560	1,922.33	237	517.34	2439.67
Apr	125,920	1,720.91	139	318.51	2039.42
May	122,400	1,658.15	123	286.05	1944.20
June	142,720	1,856.99	78	187.36	2044.35
July	136,000	2,037.24	16	40.03	2077.27
Aug.	137,920	2,072.10	24	58.77	2130.87
Sept	154,560	2,224.45	5	14.26	2238.71
Oct.	146,400	2,149.90	83	197.00	2346.90
Nov.	138,400	2,069.20	142	323.02	2392.22
Dec.	158,800	2,228.49	494	1011.82	3240.31
Total	1,681,200	23,626.58	1801	3,960.44	27,587.02

## Metro Sewer Treatment Plant

19 <u>79</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	150,000	2,178.45	433	897.18	3075.63
Feb.	141,600	2,116.97	357	754.36	2871.33
Mar	151,200	2,182.81	274	593.89	2776.70
Apr	145,200	2,145.54	153	345.59	2491.13
May	166,000	2,556.75	135	308.65	2865.40
June	214,400	3,215.38	57	136.09	3351.47
July	270,000	3,977.62	19	47.06	4024.68
Aug.	192,800	3,315.10	14	40.29	3355.39
Sept	388,800	5,299.90	26	72.52	5372.42
Oct.	372,400	5,165.46	30	90.99	5256.45
Nov.	498,000	6,835.20	107	315.58	7150.78
Dec.	561,200	7,364.25	269	810.02	8174.27
Total	3,251,600	46,353.43	1874	4,412.22	50,765.65

ENERGY CONSUMPTION DATA  
Metro Sewer Treatment Plant

19 <u>80</u>	Electricity		Natural Gas		\$ Total
	KWH	Cost	MCF	Cost	
Jan.	479,200	6,204.02	329	978.11	7182.13
Feb.	479,600	6,762.38	362	1092.31	7854.69
Mar	476,800	6624.97	228	683.74	7308.71
Apr	524,000	7,103.58	191	645.64	7749.22
May	454,000	6,331.47	49	156.02	6487.49
June	499,600	6,778.30	48	165.50	6943.80
July	508,400	6,867.53	32	110.34	6977.87
Aug.	320,800	4,840.67	25	86.20	4926.87
Sept	398,000	5,452.16	36	124.13	5576.29
Oct.	395,200	5,766.40	37	127.58	5893.98
Nov.	499,600	6,918.46	96	331.01	7249.47
Dec.	402,000	5,788.64	241	830.97	6619.61
Total	5,437,200	75,438.58	1674	5,331.55	80,770.13

Metro sewer treatment Plant

19 <u>81</u>	Electricity		Natural Gas		\$ Total
	KWH	Cost	MCF	Cost	
Jan.	374,400	6,437.42	274	1099.38	7536.80
Feb.	425,600	6,786.15	188	749.53	7535.68
Mar	302,800	5,120.79	127	501.38	5622.17
Apr	325,600	5,330.82	62	255.38	5586.20
May	418,800	6,824.52	65	267.74	7092.26
June	446,000	7,111.42	57	234.78	7346.20
July	405,600	6,656.15	43	182.43	6838.58
Aug.	456,000	7,175.34	52	219.43	7394.77
Sept	360,400	6,131.11	67	294.00	6425.11
Oct.	368,400	5,906.88	118	517.78	6424.66
Nov.	409,600	6,569.52	167	732.80	7302.32
Dec.	359,200	5,770.25	332	1440.33	7210.58
Total	5,060,800	75,820.37	1552	6,494.96	82,315.33

# ENERGY CONSUMPTION DATA

## Butte Public Library

19 <u>78</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	7,104	226.49	200.3	442.88	669.37
Feb.	7,380	232.19	209.3	461.14	693.33
Mar	6,852	226.76	162.3	365.78	592.54
Apr	6,720	220.81	138.4	317.29	538.10
May	6,636	230.03	148.8	338.39	568.42
June	5,520	194.66	88.6	210.12	404.78
July	4,416	167.50	1.7	6.52	174.02
Aug.	3,924	161.45	1.5	6.06	167.51
Sept	5,364	193.60	33	79.86	273.46
Oct.	5,436	193.30	142.1	323.22	516.52
Nov.	6,420	216.48	213.5	469.74	686.22
Dec.	7,428	235.68	247.3	539.10	774.78
Total	77,124	2498.95	1586.8	3560.10	6059.05

## Butte Public Library

19 <u>79</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	7,596	235.48	308.2	662.65	898.13
Feb.	7,128	226.46	232.8	509.34	735.80
Mar	7,188	227.43	183.9	409	636.43
Apr	7,272	228.79	169.0	378.42	607.21
May	7,296	229.17	128.0	294.29	523.46
June	5,796	204.94	111.5	260.43	465.37
July	2,976	129.92	16.9	42.14	172.06
Aug.	2,784	120.35	1.3	6.17	126.52
Sept	3,384	136.61	36.4	109.84	246.45
Oct.	4,956	189.43	99.5	295.63	485.06
Nov.	5,832	204.07	187.8	528.86	732.93
Dec.	5,880	201.93	195.5	597.70	799.63
Total	68,088	2,334.58	1,670.8	4,094.47	6,429.05

# ENERGY CONSUMPTION DATA

## Butte Public Library

19 <u>80</u>	Electricity KWH Cost		Natural Gas MCF Cost		\$ Total
Jan.	5844	205.34	224.7	673.68	879.02
Feb.	6264	210.69	218	653.25	863.94
Mar	6384	217.04	149	500.82	717.86
Apr	7308	230.57	141.2	473.93	704.50
May	6792	223.66	27.5	94.82	318.48
June	6300	212.75	46.9	161.71	374.46
July	6240	208.84	1.9	6.55	215.39
Aug.	5604	199.98	1.7	5.86	205.84
Sept	6444	216.54	26.9	92.75	309.29
Oct.	6156	208.94	85.3	294.11	503.05
Nov.	6840	221.51	156.9	540.99	762.50
Dec.	7128	227.65	269.3	928.55	1156.20
Total	77,304	2,583.51	1,349.3	4,427.02	7,010.53

## Butte Public Library

19 <u>81</u>	Electricity KWH Cost		Natural Gas MCF Cost		\$ Total
Jan.	7272	273.39	77.3	299.20	572.59
Feb.	6672	258.33	207.7	829.67	1088
Mar	6864	262.04	150.0	594.95	856.99
Apr	6156	248.37	134.70	532.70	781.07
May	5376	233.32	103.0	424.26	657.58
June	5088	229.50	7.2	29.66	259.16
July	5244	227.29	1.4	5.77	233.06
Aug.	4764	214.93	1.1	4.53	219.46
Sept	3948	187.44	1.1	4.53	191.97
Oct.	5064	223.96	98.0	223.96	447.92
Nov.	5688	237.54	123.3	541.04	778.58
Dec.	6936	266.43	182.7	801.69	1068.12
Total	69,072	2,862.54	1,087.5	4,291.96	7,154.50

# ENERGY CONSUMPTION DATA

## Public Safety Building

1978	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	19,280	427.88	361.4	757.47	1185.37
Feb.	17,840	406.57	304.0	652.48	1059.05
Mar	18,240	415.17	291.9	628.73	1043.90
Apr	14,800	313.68	143.1	326.83	640.51
May	16,400	385.25	131.3	302.89	688.14
June	17,280	396.94	109.6	258.86	655.80
July	16,480	391.60	59.0	140.77	532.37
Aug.	15,840	390.96	23.2	56.90	447.86
Sept	18,240	423.67	70.0	166.54	590.21
Oct.	14,160	351.70	91.5	216.92	568.62
Nov.	17,600	408.48	181.1	403.25	811.73
Dec.	18,560	427.62	332.8	708.88	1136.50
Total	204,720	4739.52	2,098.9	4620.54	9360.06

## Public Safety Building

1979	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	21,280	470.85	435.3	901.50	1372.35
Feb.	20,160	459.14	352.8	746.47	1205.61
Mar	18,560	430.05	241.4	526.99	957.04
Apr	18,000	422.21	193.8	429.31	851.52
May	15,680	383.53	125.8	289.77	673.30
June	16,000	382.64	92.5	219.26	601.90
July	17,760	420.77	44.8	107.50	528.27
Aug.	20,000	459.38	21.7	60.97	520.35
Sept	18,720	435.07	20.9	58.82	493.89
Oct.	16,400	398.80	60.0	181.09	579.89
Nov.	18,720	429.00	179.0	505.63	934.63
Dec.	16,240	391.37	235.70	713.83	1105.20
Total	217,520	5,082.81	2,004.3	4,741.14	9,823.95



# ENERGY CONSUMPTION DATA

## Public Safty Building

19_80	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	20,800	466.70	281.5	846.86	1313.56
Feb.	19,280	445.21	319.8	963.64	1408.85
Mar	17,360	414.04	225.5	676.12	1090.16
Apr	16,960	407.54	215.0	728.39	1135.93
May	19,120	440.17	85.8	295.84	736.01
June	19,280	448.87	98.8	340.66	789.53
July	23,280	504.53	78.2	269.63	774.16
Aug.	20,720	472.92	41.0	141.37	614.29
Sept	23,280	506.97	69.0	237.91	744.88
Oct.	18,720	439.78	75.5	260.32	700.10
Nov.	18,000	425.65	133.7	461.00	886.65
Dec.	22,800	500.36	271.3	935.44	1435.80
Total	239,600	5,472.74	1,895.1	6,157.18	11,629.92

## Public Safety Building

19_81	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	21,760	481.15	211.3	715.63	1196.78
Feb.	20,640	556.52	249.5	999.71	1556.23
Mar	20,000	546.04	192.2	766.61	1312.65
Apr	17,280	493.54	170.5	678.34	1171.88
May	19,520	535.33	124.4	512.40	1047.73
June	22,160	587.21	102.3	421.37	1008.58
July	18,320	515.06	36.1	148.70	663.76
Aug.	16,800	485.72	15.8	65.08	550.80
Sept	21,200	558.83	11.6	80.73	639.56
Oct.	16,400	465.28	106.0	465.13	930.41
Nov.	13,920	418.12	116.3	510.32	928.44
Dec.	20,400	544.49	246.20	1080.33	1624.82
Total	228,400	6,187.29	1,590.2	6,444.35	12,631.64

# ENERGY CONSUMPTION DATA

## STODDEN PARK

19 <u>78</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	1,800	\$ 83.51	170	\$ 381.44	\$ 464.92
Feb.	1,680	78.04	139	318.51	396.55
Mar	2,100	93.19	118	275.90	369.09
Apr	2,400	102.87	68	163.72	266.59
May	2,700	110.94	57	137.71	248.65
June	4,200	173.83	58	140.07	313.90
July	17,640	427.32	842	1,665.79	2,093.11
Aug.	18,000	433.13	664	1,331.29	1,764.42
Sept	13,200	351.96	638	1,282.43	1,634.39
Oct.	2,880	118.58	47	112.66	231.24
Nov.	3,240	128.34	71	168.89	297.23
Dec.	2,940	118.75	183	407.15	525.90
Total	72,780	2,220.46	3,055	6,385.53	8,605.99

## STODDEN PARK

19 <u>79</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	2,880	\$ 109.83	179	\$ 398.94	\$ 508.77
Feb.	3,180	119.42	183	407.15	526.57
Mar	2,460	98.44	121	279.92	378.36
Apr	2,280	93.56	66	157.17	250.73
May	2,820	121.32	49	117.34	238.66
June	4,560	183.08	24	58.77	241.85
July	14,760	377.16	763	1,526.73	1,903.89
Aug.	17,820	426.59	823	1,896.34	2,322.93
Sept	12,660	343.24	576	1,353.63	1,696.87
Oct.	3,120	142.58	24	73.33	215.91
Nov.	2,280	97.93	69	205.83	303.76
Dec.	1,980	85.43	140	437.39	522.82
Total	70,800	2,198.58	3,022	6,912.54	9,111.12

# ENERGY CONSUMPTION DATA

## STODDEN PARK

19 <u>80</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	2,820	\$ 114.03	150	\$ 466.27	\$ 580.30
Feb.	2,760	111.54	150	445.92	557.46
Mar	1,860	85.54	99	290.42	375.96
Apr	2,280	95.53	94	311.18	406.71
May	2,880	132.39	31	93.96	226.35
June	3,720	155.28	35	120.68	275.96
July	14,340	369.88	904	3,116.99	3,486.87
Aug.	13,860	363.31	574	1,979.15	2,342.46
Sept	11,520	322.87	493	1,699.86	2,022.73
Oct.	3,300	145.31	23	79.30	224.61
Nov.	1,500	89.68	48	165.50	255.18
Dec.	3,180	131.78	118	406.86	538.64
Total	64,020	\$2,117.14	2,719	\$9,176.09	\$11,293.23

## STODDEN PARK

19 <u>81</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	2,460	\$ 117.64	102	\$ 399.68	\$ 517.32
Feb.	1,980	102.09	96	375.27	477.36
Mar	2,760	132.59	93	363.07	495.66
Apr	3,420	176.61	31	127.69	304.30
May	3,780	181.30	43	177.12	358.42
June	14,160	439.12	738	3,039.82	3,478.94
July	15,720	472.13	502	2,438.45	2,910.58
Aug.	8,580	325.12	40	185.36	510.48
Sept	3,900	200.49	19	83.37	283.86
Oct.	1,860	98.48	56	245.73	344.21
Nov.	1,320	69.96	78	342.26	412.22
Dec.	2,040	102.50	126	536.40	638.90
Total	61,980	\$2,418.03	2,019	\$8,314.22	\$10,732.25

# ENERGY CONSUMPTION DATA

## AIRPORT TERMINAL

1978	Electricity		Natural Gas		\$
	KWH	Cost	MCF	Cost	Total
Jan.	34,800	\$ 742.23	483	\$ 979.96	\$ 1722.19
Feb.	30,720	663.39	399	826.28	1489.67
Mar	33,360	689.97	442	904.95	1594.92
Apr	27,360	603.97	243	529.52	1133.49
May	26,160	596.15	251	545.75	1141.90
June	28,320	645.07	194	430.10	1075.17
July	33,360	716.47	141	320.97	1037.44
Aug.	25,680	616.07	74	175.92	791.99
Sept	32,400	697.24	125	288.13	985.37
Oct.	26,880	617.95	176	392.79	1010.74
Nov.	31,920	687.02	329	701.74	1388.76
Dec.	35,760	754.21	530	1079.47	1833.68
Total	366,720	8029.74	3387	7175.58	15,205.32

## AIRPORT TERMINAL

1979	Electricity		Natural Gas		\$
	KWH	Cost	MCF	Cost	Total
Jan.	38,160	\$ 787.10	616	\$ 1241.08	\$ 2028.18
Feb.	28,800	664.88	440	910.34	1575.22
Mar	35,760	745.72	412	857.72	1603.44
Apr	33,360	712.83	299	645.19	1358.02
May	32,160	690.31	252	548.74	1239.05
June	22,320	559.10	136	310.71	869.81
July	20,640	513.03	82	194.66	707.69
Aug.	17,760	476.57	17	48.35	524.92
Sept	18,960	487.46	68	185.34	672.80
Oct.	17,760	462.01	94	279.43	741.44
Nov.	29,040	647.55	258	714.15	1361.70
Dec.	36,240	755.94	394	1154.15	1910.09
Total	330,960	7502.50	3068	7089.86	14,592.36

# ENERGY CONSUMPTION DATA

## AIRPORT TERMINAL

19 <u>80</u>	Electricity KWH Cost		Natural Gas MCF Cost		\$ Total
Jan.	36,240	\$ 758.36	412	\$ 1202.90	\$ 1961.26
Feb.	37,920	802.56	519	1571.00	2373.56
Mar	36,480	794.91	365	1101.46	1896.37
Apr	37,440	776.43	346	1180.08	1956.51
May	26,640	632.51	146	490.48	1122.99
June	28,320	636.15	160	551.68	1187.83
July	26,160	611.27	90	310.32	921.59
Aug.	29,040	654.61	76	262.05	916.66
Sept	21,360	507.34	98	337.90	845.24
Oct.	22,800	574.74	148	510.30	1085.04
Nov.	29,040	677.78	294	1013.71	1691.49
Dec.	25,680	610.76	415	1430.92	2041.68
Total	357,120	8037.42	3069	9962.80	18,000.22

## AIRPORT TERMINAL

19 <u>81</u>	Electricity KWH Cost		Natural Gas MCF Cost		\$ Total
Jan.	23,040	655.26	390	1571.27	2226.53
Feb.	25,680	701.39	322	1294.64	1996.03
Mar	21,360	642.24	251	1005.81	1648.05
Apr	26,400	700.13	207	852.63	1552.76
May	24,000	660.83	146	601.37	1262.20
June	26,160	703.45	118	486.04	1189.49
July	26,400	720.43	82	337.76	1058.19
Aug.	28,560	744.72	74	304.81	1049.53
Sept	31,440	812.62	192	842.50	1655.12
Oct.	28,800	755.74	281	1233.03	1988.77
Nov.	35,760	899.47	429	1882.45	2781.92
Dec.	32,880	858.71	531	2313.54	3172.25
Total	330,480	8,854.99	3023	12,725.85	21,580.84

# ENERGY CONSUMPTION DATA

## COMMUNITY CENTER

1978	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	10,560	\$ 298.82	528.8	\$ 1,063.75	\$ 1,362.57
Feb.	11,280	308.14	442.0	904.95	1,213.09
Mar	13,320	338.33	455.8	930.20	1,268.53
Apr	8,320	264.33	193	428.07	692.40
May	10,120	289.63	234.1	511.46	801.09
June	9,120	276.36	169.1	378.63	654.99
July	7,120	231.92	156	39.09	271.01
Aug.	5,640	192.22	95	24.80	217.02
Sept	7,120	242.83	398	95.79	338.62
Oct.	11,000	310.36	248	540.54	850.90
Nov.	11,920	326.43	396.9	829.34	1,155.77
Dec.	10,960	312.14	539.2	1,096.76	1,408.90
Total	116,480	3,391.51	3855.9	6,843.38	10,234.89

## COMMUNITY CENTER

1979	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	10,520	\$ 305.03	669.5	\$ 1,341.62	\$ 1,646.65
Feb.	10,960	313.36	545.5	1,108.60	1,421.96
Mar	10,880	308.43	407	848.32	1,156.75
Apr	10,840	315.05	335.4	713.77	1,028.82
May	10,720	308.26	250.8	546.28	854.54
June	9,440	282.74	154.8	349.28	632.02
July	9,320	277.16	56.2	134.21	411.37
Aug.	8,480	262.38	11.5	33.57	295.95
Sept	9,400	279.66	25.7	71.72	351.38
Oct.	12,360	332.33	171.3	485.30	817.63
Nov.	11,680	323.77	355.4	961.21	1,284.98
Dec.	12,120	330.88	460.5	1,334.26	1,665.14
Total	126,720	3,639.05	3443.6	7,928.14	11,567.19

# ENERGY CONSUMPTION DATA

## COMMUNITY CENTER

19 <u>80</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	11,200	\$ 316.01	454	\$ 1,372.82	\$1,688.83
Feb.	11,320	317.19	439.3	1,328.00	1,645.19
Mar	10,800	305.08	301.3	907.23	1,212.31
Apr	12,160	330.82	332.1	1,132.15	1,462.97
May	10,520	302.98	120.8	416.52	719.50
June	9,440	278.12	127.5	439.62	717.74
July	6,840	224.44	11.2	38.62	263.06
Aug.	5,600	195.51	9.5	32.76	228.27
Sept	7,240	244.84	17.3	59.65	304.49
Oct.	9,600	294.14	171.3	590.64	884.78
Nov.	10,520	309.08	311.1	1,072.67	1,381.75
Dec.	12,120	335.06	470.4	1,621.94	1,957.00
Total	117,360	3,453.27	2,765.8	9,012.62	12,465.89

## COMMUNITY CENTER

19 <u>81</u>	Electricity KWH	Cost	Natural Gas MCF	Cost	\$ Total
Jan.	9,200	\$ 285.20	373.2	1,273.86	1,559.06
Feb.	10,760	369.14	469.7	1,895.48	2,264.62
Mar	11,000	376.67	354.6	1,427.26	1,803.93
Apr	9,280	340.57	269.2	1,079.85	1,420.42
May	9,400	339.99	226.7	933.78	1,273.77
June	8,000	297.03	103.7	427.14	724.17
July	6,600	263.91	17.3	71.26	335.17
Aug.	7,040	282.85	15.2	62.61	345.46
Sept	9,160	334.72	18.4	75.79	410.51
Oct.	10,440	361.92	200.5	879.79	1,241.71
Nov.	11,080	372.67	300.8	1,319.91	1,692.58
Dec.	12,800	418.23	419.4	1,840.33	2,258.56
Total	114,760	4,042.90	2,768.7	11,287.06	15,329.96

## APPENDIX F

BUTTE - SILVER BOWNATURAL GAS-BTU CONSUMPTION

NAME	YEAR	NAT. GAS IN BTU	BTU/SQ. FT.	BTU/SQ.FT./°Day
Archives	78	615,200,000	122,063	14.871
5040	79	13,400,000	2,659	.335
	80	202,600,000	40,198	5.123
Civic Center	78	13,284,000,000	249,812	30.435
53,176	79	12,164,000,000	228,750	28.850
	80	11,623,000,000	218,576	27.855
Community Center	78	3,271,800,000	159,600	19.444
20,500	79	3,443,600,000	167,980	21.186
	80	2,765,800,000	134,917	17.193
Court House	78	15,757,000,000	130,223	15.865
121,000	79	13,876,000,000	114,678	14.463
	80	12,527,000,000	103,529	13.193
Fire Station #2	78	817,200,000	158,680	19.332
5150	79	841,200,000	163,340	20.600
	80	741,200,000	143,922	18.341
Library	78	1,586,800,000	137,469	16.748
11,543	79	1,670,800,000	144,746	18.255
	80	1,349,300,000	116,893	14.897
Public Safety	78	2,098,900,000	101,191	12.328
20,742	79	2,004,300,000	96,630	12.187
	80	1,895,100,000	91,365	11.643
Stodden Park Pool	78	3,055,000,000	259,034	31.558
11,793.8	79	3,022,000,000	256,236	32.316
	80	2,719,000,000	230,545	29.38
S.B. General Hosp.	78	33,186,000,000	240,161	29.25
138,182	79	36,109,000,000	261,315	32.95
	80	34,675,000,000	250,937	31.97



## APPENDIX G

## BUTTE-SILVER BOW

## ELECTRICITY-BTU CONSUMPTION

BUILDING	YEAR	ELECTRICITY IN BTU	BTU/sq. FOOT	BTU/ft <sup>2</sup> /HDD
Archives	78	17,496,736	3471.6	.423
5,040 Sq. Ft.	79	12,419,680	2464.2	.311
	80	15,295,996	3034.9	.386
Civic Center	78	1,858,857,600	34,956.7	4.259
53,176 Sq. Ft.	79	2,397,680,600	45,089.5	5.687
	80	2,466,466,500	46,383.1	5.911
Community Center	78	397,429,760	19,386.8	2.362
20,500 Sq. Ft.	79	432,368,640	21,091.2	2.660
	80	400,432,320	19,533.3	2.489
Courthouse	78	1,001,442,400	8276.4	1.000
121,000	79	1,188,406,400	9821.5	1.239
	80	1,194,305,700	9870.3	1.259
Fire Station #2	78	178,925,280	34,742.8	4.233
5150	79	200,338,990	38,900.8	4.906
	80	192,764,350	37,430.0	4.770
Library	78	249,758,400	21,637.2	2.636
11,543	79	232,316,250	20,126.2	2.538
	80	263,761,240	22,850.3	2.912
Public Safety	78	698,504,640	33,675.9	4.103
20,742	79	742,178,240	35,781.4	4.513
	80	817,515,200	39,413.5	5.023
S.B. General Hosp.	78	4,397,385,600	31,821.8	3.877
	79	4,599,034,800	33,281.0	4.197
	80	4,525,335,600	32,747.7	4.173

## APPENDIX H

BUTTE SCHOOL DISTRICT ENERGY DATA

<u>BUILDING</u>	<u>YEAR</u>	<u>ELECTRICAL CONSUMPTION K.W.</u>	<u>COST</u>	<u>NAT'L GAS CONSUMPTION M.C.F.</u>	<u>COST</u>	<u>TOTAL COST</u>
<u>EMERSON</u>	78	160,080	\$4620.97	4,352.0	\$8,862.13	13,483.10
	79	156,000	\$4544.90	4,192.0	\$9,350.35	21,834.40
	80	162,120	\$4746.50	4,310.0	\$13,835.17	18,581.67
<u>GREELEY</u>	78	101,040	\$3203.17	2,689.0	\$5,680.19	8,883.36
	79	96,280	\$3100.49	2,767.0	\$6,314.82	9,451.31
	80	96,132	\$3267.48	2,869.4	\$9,165.54	12,433.02
<u>HAWTHORNE</u>	78	67,280	\$2411.92	3,282.0	\$6,889.80	9,301.72
	79	66,800	\$2383.38	3,205.2	\$7,416.16	9,799.54
	80	65,935	\$2457.39	3,818.5	\$12,287.61	14,745.00
<u>HILLCREST</u>	78	195,600	\$5301.47	3,946.0	\$8,150.53	13,452.00
	79	204,400	\$5488.42	4,351.0	\$9,741.79	15,230.20
	80	198,800	\$5434.40	3,834.0	\$12,358.88	17,793.28
<u>LINCOLN</u>	78	32,080	\$1484.33	1,492.9	\$3,352.24	4,827.57
	79	31,840	\$1379.77	1,426.1	\$3,459.40	4,838.17
	80					
<u>LONGFELLOW</u>	78	87,990	\$2982.05	5,556.5	\$11,094.55	14,076.60
	79	81,060	\$2827.15	5,160.2	\$11,433.03	14,260.18
	80	74,880	\$2760.92	5,232.6	\$16,783.71	19,544.68

(continued)

<u>BUILDING</u>	<u>YEAR</u>	<u>ELECTRICAL CONSUMPTION K.W.</u>	<u>COST</u>	<u>NAT'L GAS CONSUMPTION M.C.F.</u>	<u>COST</u>	<u>TOTAL COST</u>
<u>MADISON</u>	78					
	79	45,460	\$1870.91	2,208.20	\$5,167.32	7,038.23
	80					
<u>MCKINLEY</u>	78	124,560	\$3838.49	6,185.30	\$1,235.63	16,154.12
	79	122,480	\$3836.11	6,479.30	\$14,012.73	17,848.84
	80	118,960	\$3790.59	5,833.20	\$18,712.89	22,503.48
<u>MONROE</u>	78	94,080	\$3104.19	3,348.90	\$7,009.79	10,113.98
	79	90,160	\$2993.94	3,419.70	\$7,741.58	10,735.52
	80	90,800	\$3044.48	3,213.10	\$10,312.76	13,357.24
<u>SHERMAN</u>	78	47,970	\$4827.62	2,273.90		
	79	2,550	\$151.15	1,755.20	\$19,630.77	24,097.21
	80					
<u>WEBSTER GARFIELD</u>	78	151,680	\$4426.50	9,344.00	\$18,110.58	22,537.08
	79	145,560	\$4466.44	9,172.00	\$19,630.77	24,097.21
	80	143,400	\$4378.24	8,106.00	\$25,956.48	30,334.72
<u>WHITTIER</u>	78	195,920	\$5361.91	6,466.00	\$12,814.41	18,176.32
	79	186,880	\$5243.06	6,400.00	\$13,977.69	19,220.75
	80	188,240	\$5230.63	6,427.00	\$20,612.95	25,843.58

(continued)

<u>BUILDING</u>	<u>YEAR</u>	<u>ELECTRICAL CONSUMPTION K.W.</u>	<u>COST</u>	<u>NAT'L GAS CONSUMPTION M.C.F.</u>	<u>COST</u>	<u>TOTAL COST</u>
<u>BUTTE</u>	78	683,866	\$14,985.68	19,868.70	\$37,989.45	52,975.13
<u>HIGH</u>	79	636,589	\$14,152.07	18,693.10	\$39,126.44	53,278.51
<u>SCHOOL</u>	80	632,976	\$14,112.68	18,314.60	\$57,693.67	71,806.35
<u>EAST</u>	78	815,760	\$18,778.16	16,702.00	\$31,333.66	50,111.82
<u>JUNIOR</u>	79	799,800	\$18,606.36	16,632.00	\$34,692.77	53,299.13
<u>HIGH</u>	80	750,600	\$16,869.18	15,940.00	\$51,448.86	68,318.04
<u>BLAINE</u>	78	71,640	\$2,504.07	1,929.40	\$4,251.06	6,755.13
	79	64,180	\$2,366.12	1,933.60	\$4,618.48	6,984.60
	80	61,660	\$2,357.17	2,013.90	\$6,534.08	8,891.25
<u>KENNEDY</u>	78	69,840	\$2,544.89	3,247.00	\$6,781.08	9,325.97
	79	68,280	\$2,480.66	3,261.00	\$7,449.30	9,929.96
	80	69,000	\$2,504.43	3,165.00	\$10,033.11	12,537.54
<u>VO-TECH</u>	78	630,360	\$12,910.77	3,979.00	\$8,160.39	21,071.16
	79	600,120	\$12,781.54	4,103.00	\$9,052.50	21,834.04
	80	617,040	\$13,010.54	3,450.00	\$11,066.18	24,076.72
<u>MARGARET</u>	78	171,920	\$4,776.05	2,326.10	\$4,990.09	9,766.14
<u>LEARY</u>	79	168,320	\$4,739.96	2,205.00	\$5,086.76	9,826.72
	80	156,480	\$4,521.30	2,000.70	\$6,407.65	10,928.95

## Continued

<u>BUILDING</u>	<u>YEAR</u>	<u>ELECTRICITY</u> <u>BTUs/sq. ft</u>	<u>ELECTRICITY</u> <u>BTUs/sq ft/HDD</u>	<u>NATURAL GAS</u> <u>BTUs/sq ft.</u>	<u>NATURAL GAS</u> <u>BTUs/sq ft/HDD</u>
<u>BUTTE</u>	78	12,076	1.47	102,829	12.53
<u>HIGH</u>	79	11,241	1.42	96,745	12.20
<u>SCHOOL</u>	80	11,177	1.42	94,786	12.08
<u>EAST</u>	78	20,169	2.46	121,029	14.75
<u>JUNIOR</u>	79	19,775	2.49	120,522	15.20
<u>HIGH</u>	80	18,558	2.37	115,507	14.72
<u>WEST</u>	78	31,585	3.85	123,568	15.05
<u>JUNIOR</u>	79	34,384	4.34	120,009	15.14
<u>HIGH</u>	80	34,506	4.40	123,319	15.72
<u>VO-TECH</u>	78	43,478	5.30	80,435	9.80
	79	41,393	5.22	82,942	10.46
	80	42,560	5.42	69,742	8.89
<u>BLAINE</u>	78	17,761.63	2.16	140,198	17.08
	79	15,912.09	2.01	140,503	17.72
	80	15,287.31	1.95	146,338	18.65
<u>KENNEDY</u>	78	9,272.14	1.13	126,342	15.39
	79	9,065.03	1.14	126,887	15.00
	80	9,160.62	1.17	123,152	15.69
<u>EMERSON</u>	78	12,852	1.57	102,400	12.48
	79	12,524	1.58	98,635	12.44
	80	13,015	1.66	101,412	12.92

(continued)

<u>BUILDING</u>	<u>YEAR</u>	<u>ELECTRICITY</u> <u>BTUs/sq. ft</u>	<u>ELECTRICITY</u> <u>BTUs/sq ft/HDD</u>	<u>NATURAL GAS</u> <u>BTUs/sq ft.</u>	<u>NATURAL GAS</u> <u>BTUs/sq ft/HDD</u>
<u>GREELEY</u>	78	12,923	1.57	99,593	12.13
	79	12,315	1.55	102,481	12.92
	80	12,296	1.57	106,274	13.54
<u>HAWTHORNE</u>	78	11,448	1.39	175,658	21.40
	79	11,367	1.43	172,382	21.74
	80	11,219	1.43	193,641	23.59
<u>HILLCREST</u>	78	18,793	2.29	111,117	13.54
	79	19,659	2.48	122,522	15.45
	80	19,101	2.43	107,963	13.76
<u>LONGFELLOW</u>	78	9,061	1.10	167,708	20.43
	79	8,347	1.02	155,747	19.64
	80	7,711	.98	157,932	20.13
<u>M<sup>C</sup>KINLEY</u>	78	12,500	1.52	181,921	22.16
	79	12,291	1.55	190,568	24.03
	80	11,938	1.52	171,565	21.86
<u>MONROE</u>	78	14,492	1.77	151,192	18.42
	79	13,883	1.75	154,388	19.47
	80	13,987	1.78	145,061	18.49
<u>WEBSTER</u>	78	9,152	1.11	165,234	20.13
<u>GARFIELD</u>	79	8,782	1.11	162,193	20.46
	80	8,652	1.10	143,342	18.27

(continued)

BUILDING	YEAR	ELECTRICITY BTUs/sq ft.	ELECTRICITY BTUs/sq ft/HDD	NATURAL GAS BTUs/sq ft.	NATURAL GAS BTUs/sq ft/HDD
<u>WHITTIER</u>	78	17,285	2.11	167,192	20.37
	79	16,487	2.08	165,486	20.81
	80	16,607	2.11	166,164	21.17
<u>MARGARET</u>	78	20,158	2.46	79,935	9.74
<u>LEARY</u>	79	19,736	2.49	75,773	9.56
	80	18,347	2.34	68,253	8.76

\*HDD- heating degree day

BUTTE-SILVER BOW ORGANIZATIONAL CHART

